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JANUARY, 1899.

A CASE OF ERYTHROMELALGIA,

WITH MICROSCOPICAL EXAMINATION OF THE TISSUE FROM AN AMPUTATED TOE.[1]

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AND

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(*From the William Pepper Laboratory of Clinical Medicine, University of Pennsylvania.*)

It is known to neurologists that in 1872, and again later, one of the authors of this paper described cases of red neuralgia, and spoke of it as an unrecognized disease. Since then he has reported many cases. In this country the diagnosis has been disputed or the disease has been confused with Raynaud's malady. In the text-books it has frequently been hopelessly misunderstood. In France, however, a treatise (Lannois) was published upon it at an early date, and in England and, of late, in Germany it is fully accepted as a distinct malady by certain writers. It is now too well known to make a detailed description necessary. In its purity of type it must be seen in the younger adult. In older persons there are variations such as our present patient offers. In young cases there may be no pain and no flush when the limb is in a horizontal position, but the arteries throb, the temperature rises, and the redness becomes intense when the foot is pendent. In old cases and older people the temperature obeys the normal law and falls when the foot is down, and the flush and pain are less surely absent from the elevated foot. The tenderness, also, in these aberrant types is not so very much increased by pendency as is the case when the disease is more recent.

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[1] Read at the twenty-fourth annual meeting of the American Neurological Association, held in New York, May 26, 27, and 28, 1898.

J. C., a merchant, married, aged sixty-one years, has had neither syphilis nor gonorrhœa. He is said to have had typhoid fever at the age of twenty, again in 1863, and once more in 1865. In June, 1863, he was in the army, was captured, and spent ten months in Libby prison. In August, 1864, he had a sunstroke, was unconscious eight hours, and has remained sensitive to the heat of the sun since that time.

He had fair health until 1897. In July of that year he began to have limited areas of savage pain in the right foot, with tenderness and intense flush when the limb hung down or was used. The disturbances were noted in various parts of the sole and toes, lasting for months in certain localities, and always with extensive flushes.

While the fourth and fifth toes were thus disordered, a small, deep, painful ulcer came on the outside of the fourth toe and healed slowly. After three months these toes seemed to be nearly well, and the second and third toes were furiously attacked. As, in turn, these parts improved, the great toe was similarly seized with violent pain, and has remained in this state, the former seats of disease having lost all active pain and nearly all tenderness. Cold relieved the pain, but heat made it worse. To raise the foot above a level eased the pain ; to let the foot hang down made the pain worse ; to stand or walk made it unendurable.

Dr. William A. Dickey, of Tiffin, Ohio, recognized the disorder and brought Mr. C. to consult one of us (Dr. Mitchell). He was examined by Dr. J. K. Mitchell, whose notes are used with those of Dr. Harrison, the resident at the Infirmary for Nervous Diseases.

The great toe was slightly red, but not swollen. More or less pain was felt at all times, and of late the pain was worse during the day. Handling, pressure, heat, pendency, walking, increased the pain enormously, and with it the redness. He was using morphine freely, but slept very little. He was very nervous, and feared to be touched anywhere on the painful foot. He did not seem to have any real discomfort from pressure except in the great toe.

The heart was very feeble. A faint rhythmic murmur was heard at the apex. The heart-beat was so feeble as to make the results of the study doubtful. The arteries were soft, and no excess of tension was noted. A slight arcus senilis was observed. The urine was negative.

The affected limb was strong and not wasted, and no tenderness was found over the trunks of the nerves. The right knee-jerk was + +, and successive hammer blows caused frequent repetition of response. The left knee-jerk was +, but no ankle clonus was obtained. The ankle-jerks were excessive. Urination and defecation were normal.

The patient could localize touch, could feel pain when stuck with a pin, and could distinguish extremes of temperature in all parts, even in the painful foot. It was impossible to examine him with the com-passes, on account of the pain caused by the attempt. No disturbance of sensation for touch and pain could be found in the buttocks, perineum, external genitalia, and thighs. The pain experienced by the patient was intense, and many remedies had been tried in vain. The disease seemed to be limited to the great toe. The whole right foot appeared to be somewhat larger than the left, and the instep arch was less well formed. In the great toe alone all the symptom-peculiarities found in an advanced case and in a patient past middle age were observed. A small ulcer was present beneath the toe-nail of the great toe. The diagnosis was clear.

Little benefit has been obtained in cases of this disease until one of us (Dr. Mitchell) cured radically a case in a young man by stretching the posterior tibial nerve and cutting the musculo-cutaneous and the fillets of the external saphenous nerve. The result was a complete cure and permanent freedom from pain.

In the next case presenting itself an operation was decided on with entire confidence.

The patient was forty-two years old, and a man of good and active habits. Drs. Morris J. Lewis, J. K. Mitchell, and S. Weir Mitchell examined the man with unusual care, and found no reason to suspect organic disease. The details of this report have been given elsewhere.[1] Both of these cases were of traumatic origin. The operation in the second case was precisely like that in the successful one, but it resulted in gangrene. The patient was removed by his friends to a homœopathic hospital, and died there on the table while undergoing amputation. No satisfaction was given as to the pathological condition, but it was learned that the walls of the small arteries were much thickened. No information was obtained concerning the nerve-ends. The portions of the nerve-trunks removed by Dr. Morton, who operated, were in perfect health. No indications of truncal neuritis were observed.

The patient J. C. had this peculiarity: the circulation in the left leg was good, but in the right leg below the groin neither Dr. Morton nor Dr. Weir Mitchell could feel an arterial pulse. Dr. John K. Mitchell, while taking the notes, felt the beat of the posterior tibial artery, and tested it as compared with the ulnar pulse. The vessel certainly could not be normal, and this conclusion, drawn from clinical observation, has been fully confirmed by the high degree of arterio-sclerosis found at the microscopical examination. This condition of the arteries, with the fate of the patient just mentioned, rendered unwise a stretching of nerves which innervated a territory larger than that occupied at the time by the disease. It was resolved to amputate the toe and half of the metatarsal bone; this was done on April 3, 1898, by Dr. T. G. Morton, without tourniquet or rubber bandage. The arteries jetted freely. The wound was closed as usual.

Mr. C. complained next day of pain in the wound, but this gradually lessened. On April 8th the lower fourth of the wound opened with a slough half an inch long, but not deep. The dead part came away very slowly, and the wound healed tardily.

Ever since the operation he has complained at times of having some pain in the ball of the foot, and has certainly some reddening of the toes, with pain. He thinks the pain is "different," and that he is better. We are not so very sanguine as to his future freedom from pain, and the caution which limited the operative procedure was wise.

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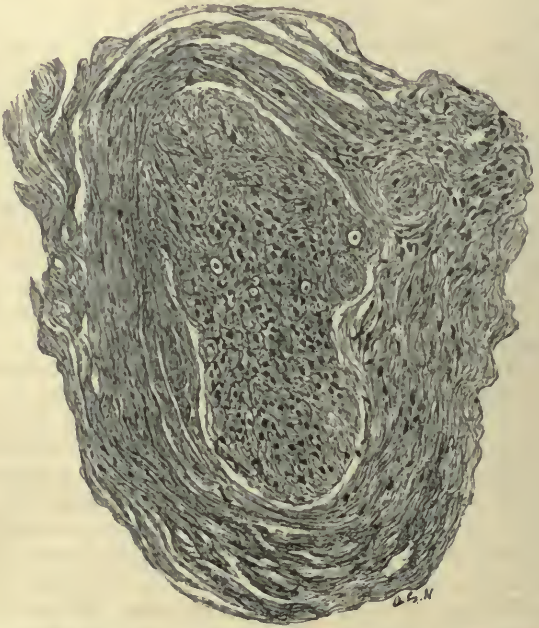
[1] Mitchell. Clinical Lessons on Nervous Diseases.

The report of this case has been given briefly, because the subject of operation has been discussed in the *Clinical Lessons*, and because Dr. Dickey will report the case more fully after some months have elapsed.

The findings in this case are of the most interesting character. The nerves of the great toe are intensely degenerated. Teased and stained in the fresh state with osmic acid, or stained with osmic acid and cut with the microtome, they show scarcely any nerve fibres; so few, indeed, that we hardly dared believe the findings could be correct until we had confirmed our observations by sections of nerve fibres hardened in formalin and stained by Weigert's hæmatoxylin method. The nerve bundles are composed almost entirely of connective tissue; here and there in a longitudinal section one, two, or three fibres stand out distinctly from the light background of connective tissue, but even these nerve fibres exhibit irregular segmentation of the myelin. In transverse sections hardly more than three or four nerve fibres, with axis cylinders and medullary sheaths, may be seen in a nerve bundle, and

FIG. 1.

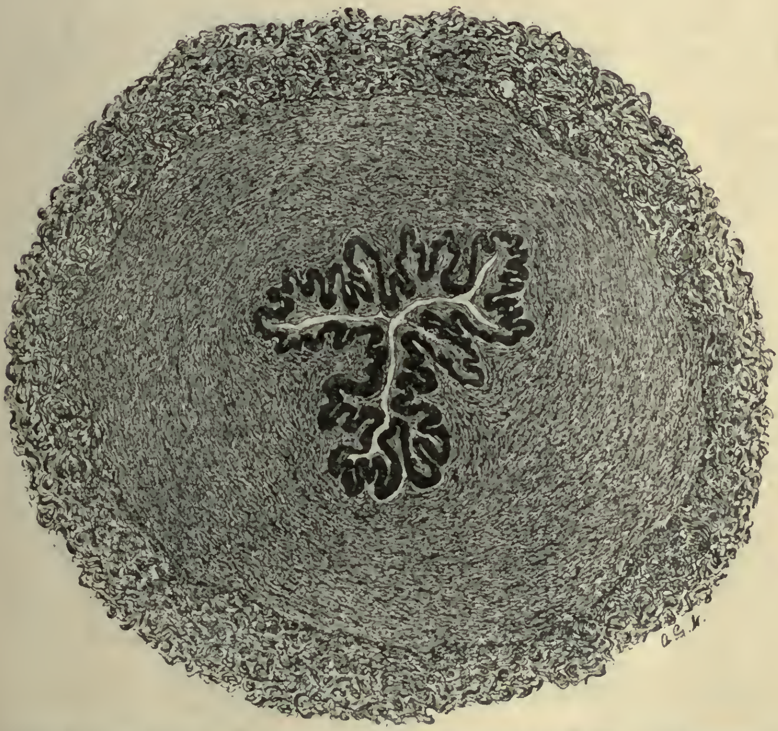


Transverse section of a nerve bundle from the great toe. The connective-tissue sheath is thickened and the nerve fibres are almost entirely degenerated; only four or five normal nerve fibres are seen.

in some bundles no nerve fibres at all are found. The connective tissue about these bundles is much thickened. The smallest fasciculi are entirely degenerated. This cannot be due to faulty technique, for the results obtained by osmic acid are the same as those obtained by Weigert's hæmatoxylin stain, and in using the latter method care has been taken to avoid too great decolorization. We have not been willing to depend on Pal's modification of Weigert's stain, as nerve fibres by the former method are frequently too much decolorized.

The vessels are no less interesting than the nerves. The media in the vessels of quite good size is thickened and the intima is intensely proliferated, so much so that it projects into the lumen of the vessels in great (microscopically speaking) masses of unequal size, and in some places nearly closes the lumen. In some of the smallest vessels also the lumen is almost obliterated by the proliferated intima. In one vessel, the largest we could find, the fenestrated membrane is hypertrophied to several times its normal size and presents a hyaline appearance; in another section this membrane appears to be multiplied. In

FIG. 2.

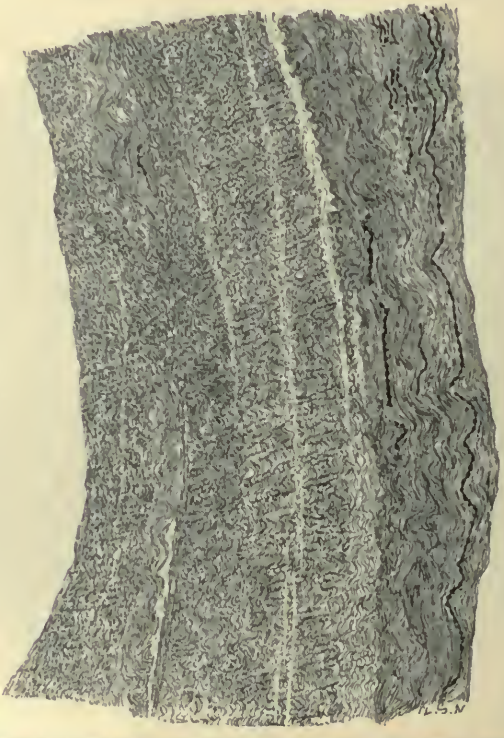


Section from an artery of the great toe. The media is much thickened. The elastic membrane is wider than in normal arteries and shows hyaline degeneration.

one place the overgrown intima projects into the vessel almost like a tumor, still attached only at one end. In another the lumen of the vessel seems to be enlarged at the expense of one side of the vessel's walls, as though an attempt had been made to restore the normal space by lateral enlargement. In some portions of one vessel the media is much more thickened than the intima. The walls of the veins are also thickened.

The bones of the great toe are larger than those in a normal adult skeleton. Our attention has been directed to this, inasmuch as Staub[1] was able to observe in erythromelalgia acute, very painful swelling of the phalanges, and of the ends of the bones in the affected parts, and after the acute stage had passed the enlargement of the bones was less noticeable, but still perceptible.

FIG. 3.



Longitudinal section of nerve bundles from the great toe. The nerve fibres are entirely degenerated, with the exception of the very few which are stained a deep black.

Lewin and Benda in 1894 collected all the cases of erythromelalgia they could find in the literature, numbering about forty-one; but none of these, as far as we can judge from the abstracts given by these writers, were with microscopical examination of tissue. From a study of these cases Lewin and Benda[1] concluded that the symptom-complex known as erythromelalgia is not a disease *sui generis*, but occurs with various cerebral and spinal maladies, in neurasthenia and hysteria, as a manifestation of neuralgia or neuritis, or as a reflex disease. Most authors, they say, regard it as a vasomotor neurosis, but this seems to us to be a very insufficient explanation. We have directed our attention to the literature which has appeared since the date of this paper.

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[1] Staub. Monatshefte für praktische Dermatologie, 1894, vol. xix. p. 10.

Heimann[2] reported two cases in which the disease was limited to the distribution of the radial nerve. He believed that the cause was a vasomotor neuritis. No examination of tissue was made. The etiology of one case was alcoholism, exposure to cold, and hard manual labor; in the second case influenza may have played a rôle.

Eulenburg[3] regards erythromelalgia as a symptom-complex probably due to central disease, and not as an independent affection. The central origin does not exclude a simultaneous involvement of the peripheral nerves. The lesion is probably chiefly in the posterior and lateral portions of the spinal cinerea.

Bernhardt[4] speaks of the resemblance of erythromelalgia to acroparæsthesia. Paræsthesia is common to both, but in the former the skin becomes red, and often swelling of the affected part is noted; the local temperature is elevated, and hyperidrosis and local bleeding are not rare. At times gastro-intestinal disturbance, migraine, ataxia, unconsciousness, organic ocular diseases, or muscular atrophies are observed, and the disease is more common in men. It differs very considerably, therefore, from acroparæsthesia.

Rost,[5] in presenting a case of erythromelalgia in the *Verein für innere Medicin in Berlin*, March 7, 1898, remarked that the disease is exceedingly rare, and that it has only received general recognition in Germany within the last few years, although it was described by Weir Mitchell in 1872. When Gerhardt, Senator, and Bernhardt each presented a case in 1892 at a meeting in Berlin, the subject attracted much attention. Rost is rather inclined to regard erythromelalgia as a *morbus sui generis*, although he had no microscopical findings to report.

Clinical cases of erythromelalgia have been reported since the publication of the paper by Lewin and Benda, by Nieden,[1] Staub,[2] Lévi[3] (one of whose cases was due to hysteria), Fischer,[4] Schenk,[5] Pezzoli,[6] Weir Mitchell,[7] Elsner,[8] Finger,[9] Pospeloff[10] (with syringomyelia), and Prentiss.[11] Other cases, references to which are given in the *Index Medicus* from 1894 to 1898, but which are not accessible to us in the original form, have been reported by Dünges, Bignone, Nolen, Christiani, Pajor, De Sanctis, and Vannini. It is likely that we have been unable to find all the cases reported, but the number as given is quite large.

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[1] Lewin and Benda. Berliner klin. Wochenschrift, 1894.

[2] Heimann. Ibid., 1896, p. 1135.

[3] Eulenburg. Deutsche med. Wochenschrift, 1893, p. 1325.

[4] Bernhardt. Die Erkrankungen der peripheren Nerven, Nothnagel's System, vol. xi., Part II., p. 446.

[5] Rost. Deutsche med. Wochenschrift, 1898, No. 13.

Of considerable interest is the case reported by Dehio, inasmuch as a portion of the trunk of the ulnar nerve was examined. Dehio states that the hyperæmia, hyperidrosis, trophic disturbances of the skin, and the pain in the left hand of his patient suffering from erythromelalgia might have been due to peripheral disease of the nerves, but he is not inclined to accept the theory that only the most peripheral parts of the nerves of the hand were affected. If the symptoms were due to neuritis, muscular atrophy and reaction of degeneration should have been found, but were not. Muscular atrophy, however, was not observed in the great toe of our patient. He believes that the disease must have had its origin in the centres from which the nerves of the hand arise. A piece of the ulnar nerve 4 cm. long, and a piece of the ulnar artery of the same length, were excised, but not the slightest pathological change could be found in the nerve when this was examined microscopically. The adventitia and media of the ulnar artery were normal, but the elastic membrane formed a hyaline band, and the intima was thickened, reducing the lumen of the vessel to about half its normal size. These findings in the vessel are not unlike those in our case.

Dehio[13] thinks that erythromelalgia is the effect of abnormal irritation of the nervous system, and that the lesion is located in the posterior and lateral horns of the cord. It may be just as well to add that neither the most peripheral portions of the nerves nor the central nervous system were examined in Dehio's case.

About a year after the excision of a portion of the artery and nerve had been made above the wrist, Dehio's patient is said to have scarcely complained of pain at all, and to have been able to use the hand for light work. This result, it seems to us, could hardly have been attained if the symptoms had been due to disease of the posterior roots, and it seems to render the theory of a peripheral neuritis possible.

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[1] Nieden. Archiv für Augenheilkunde, 1894, vol. xxviii.

[2] Staub. Monatshefte für praktische Dermatologie, 1894, vol. ix.

[3] Lévi. Archives de Neurologie, 1895, vol. xxix. p. 168. La Presse Méd., Sept. 15, 1897.

[4] Fischer. St. Petersburger med. Wochenschrift, 1895, p. 70.

[5] Schenk. Wiener medizinische Presse, 1896, No. 45, p. 1401.

[6] Pezzoli. Wiener klinische Wochenschrift, 1896, No. 53.

[7] Weir Mitchell. Clinical Lessons on Nervous Diseases.

[8] Elsner. Neurologisches Centralblatt, 1897, p. 1024.

[9] Finger. Annales de Dermatologie et de Syphiligraphie, 1897, third series, vol. viii. p. 91.

[10] Pospeloff. Idem. p. 922.

[11] Prentiss. A paper read before the Association of American Physicians, May 4, 1897.

[12] References to other cases may be found in the Index Medicus for 1898.

[13] Dehio. Berliner klin. Wochenschrift, 1896, No. 37, p. 817.

The case, with necropsy, reported by Auerbach[1] is certainly the most important in the literature of erythromelalgia since the disease was first described.. Auerbach reports briefly two cases which he considers like the case reported by Dehio. He says they were due to arterio-sclerosis and should be separated from the nervous affection known as erythromelalgia, whether the latter is central or peripheral, organic or functional. In the very condensed report of these two cases we find no mention of a microscopical examination and no statement concerning the condition of the nerves.

In a case in which the lower limbs were involved, reported very fully by him, a suspicion of tabes arose. The microscopical study was made by Edinger. The nerves of the lower limbs were perfectly normal, even in the feet, but we cannot be perfectly sure from the text that the most peripheral parts of these nerves were examined, although it is presumable that they were. The media and intima of the vessels were somewhat thickened, but not excessively so. The upper sacral and lower lumbar posterior roots were much degenerated, but the roots above these were intact. The nerve roots supplying the affected parts were the only ones diseased.

Auerbach acknowledges that the posterior roots are frequently degenerated without causing the symptoms of erythromelalgia, and he thinks that in his case vasomotor fibres were involved which, since the investigations of Goltz, are known to be present in the posterior roots. More recently, he says, the studies of Gaule have shown that a portion of the trophic vasomotor apparatus is contained in the spinal ganglia or the sympathetic fibres passing to them. Other cases of erythromelalgia in which tabetic symptoms were present have been reported clinically. Auerbach says that Edinger informed him that one of his (Edinger's) patients recovering from a severe multiple neuritis presented deep redness of both legs and feet after they had been hanging motionless a few seconds. This is a very important statement in connection with our findings.

Auerbach justly says his case gives rise to the question : What must the nature of the disease of the roots be to produce erythromelalgia? This question he does not attempt to answer.

Thoma[2] examined the vessels in a case of supra-orbital neuralgia, and found that the larger and smaller arterial branches from the supra-orbital region presented marked evidence of arterio-sclerosis, and that this sclerosis was much greater on the side where the neuralgia had existed. General arterio-sclerosis is usually attended by pain in different parts of the body. It is possible, therefore, according to Thoma, that the greater degree of the arterio-sclerosis in the supra-orbital region of the side on which the neuralgia had existed was the cause of the neuralgia, but it is just as probable that the neuralgia was the cause of the greater degree of arterio-sclerosis in the affected region. The vasomotor disturbances which accompany neuralgia cause a periodic change in the lumen of the vessels and the rapidity of the current of blood, and in course of time lead to localized endarteritis.

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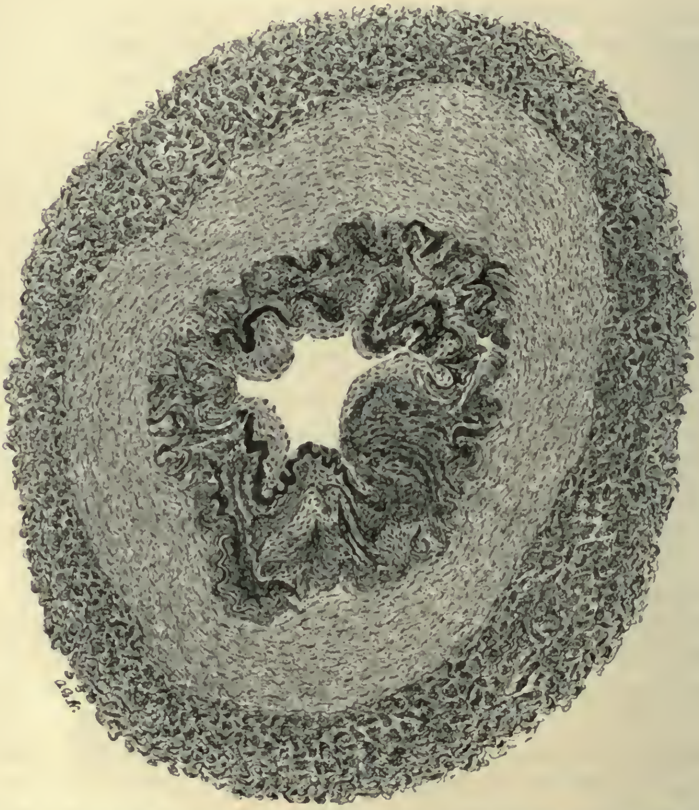
[1] Auerbach. Deutsche Zeitschrift für Nervenheilkunde, vol. xi. p. 142.

[2] Thoma. Deutsches Archiv für klinische Medicin, 1888, xliii. p. 409.

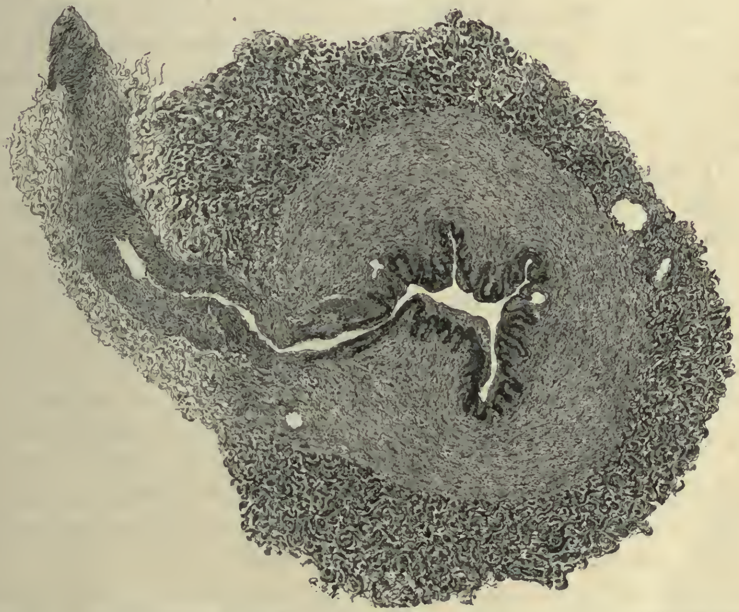
FIG. 4.



Section from an artery of the great toe. The intima is much thickened. The dark, wavy bands are probably reduplications of the elastic membrane.

Thoma was not able to observe any difference in the nerves and veins of the two supra-orbital regions. He mentions that attacks of supra-orbital neuralgia are accompanied by distinct hyperæmia of the painful region, and that this hyperæmia is due to the action of the vasomotor nerves. He has shown that when the lumen of an artery is too great for the amount of blood flowing through it, a compensatory connective-tissue thickening of the intima takes place, and the proper relations are restored. This may readily be seen in the stump after an amputation. The vessels, too large in the changed conditions, present contraction and concentric atrophy of the walls, or fibrous endarteritis, or both, and in this way the proper relations of artery and blood-current are restored. The less the contraction of the arterial wall, the greater the proliferation of the intima. This is a most ingenious explanation of the vascular alteration seen in cases of tic douloureux, and is applicable to the case of erythromelalgia reported in our paper. We are, therefore, unable to say whether the arterio-sclerosis or the neuritis of the toe was the primary lesion, as it is exceedingly probable that such disease of the vessels causes malnutrition and degeneration of nerve fibres. On the other hand, Thoma's investigations seem to

FIG. 5.



Section of an artery from the great toe. The media is thickened, and a new lumen seems to have been formed at the expense of the walls of the vessel.

show that the neuritis may occur first, and cause the proliferation of the walls of the vessels. Bervoets found arterio-sclerosis in areas in which he had cut nerve fibres (cited by Dehio).

The case of interstitial hypertrophic and progressive neuritis of childhood published by Dejerine and Sottas[1] affords some similarity pathologically to this case of erythromelalgia. Through the kindness of these authors we have been able to examine sections from the peripheral nerves of their patient, and we find a nearly equal degeneration of nerve fibres in the two cases, and yet clinically the two diseases are very different. Dejerine and Sottas regarded the neuritis observed by them as ascending.

We shall not venture to express a positive opinion in regard to the primary seat of lesion in this case of erythromelalgia. Many investigations have shown that alteration of the cell-body occurs after peripheral lesion of the neuron, and Schaffer[2] recently has reversed this order. According to him, the changes in the peripheral portion of the motor neuron in tabes are secondary to a "partial degeneration," as he calls it, of the cell-body. The exaggerated knee-jerks in the present case would indicate that the roots of the mid-lumbar region of the cord were not degenerated.

The views held by one of us (Dr. Mitchell) for many years concerning the pathology of erythromelalgia seem to be justified by recent observations. So far as we are able to ascertain from the literature examined, the only distinctly pathological findings in this disease which could be considered in a causal relation are those of Auerbach and those which we now report. Dr. Mitchell[3] has always held that erythromelalgia may be due to some form of spinal disorder, and in his latest work (p. 180) stated that he still believed that this may be true of some of the cases. More recently, however, he has been inclined to attribute the symptoms of erythromelalgia to some form of neuritis, and has spoken of nerve-end neuritis. In two previous cases of Dr. Mitchell in which trunk nerves were examined, no changes were detected within them. These observations were made by Dr. D. Braden Kyle and Dr. Charles W. Burr, but in neither case could the peripheral nerve-ends be studied.

In one of the cases of erythromelalgia reported by Dr. Mitchell (*loc. cit.*, p. 192) exaggerated knee-jerks disappeared with the cessation of pain following excision and stretching of the nerves of the foot. This is an important fact, and seems to indicate that the exaggeration was

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[1] Dejerine and Sottas. Mém. de la Soc. de Biologie, 1893. Dejerine. Revue de Médecine, November, 1896.

[2] Schaffer. Monatsschrift für Neurologie und Psychiatrie, 1898, vol. iii., No. 1.

[3] Mitchell. Clinical Lessons on Nervous Diseases.

due to pain, and warns us against placing too much value on exaggerated knee-jerks in these cases as a sign of spinal-cord disease. It is not improbable that the cells of the lumbar region controlling the knee-jerk are thrown into a state of hyperexcitability by inflammation of nerves having their reflex arc below the lumbar segment. It is uncommon to find exaggerated reflexes in neuritis, but it has been shown by one of us (Dr. Mitchell[1]) that certain forms of irritation of a nerve trunk may cause excessive irritability in the muscles supplied by the affected nerve, as was seen when a frozen nerve thawed.

We do not overlook the fact that the patient described in this paper was advanced in years, and that the arterio-sclerosis may have been largely or even entirely due to this fact. Arterio-sclerosis is not at all uncommon in the aged, and erythromelalgia is. We not infrequently find numbness and tingling in the fingers as a result of vascular disease, but we do not commonly find the grave signs of erythromelalgia. We believe, therefore, that we are justified in attributing the symptoms in this case to peripheral neuritis, but inasmuch as such neuritis was absent in Auerbach's case, we must conclude that involvement of the sensory fibres anywhere between the spinal cord—or possibly within the spinal cord—and the peripheral ramifications is capable, under certain circumstances, of causing erythromelalgia; hysteria, also, may present similar symptoms. It seems not improbable that the posterior roots and the peripheral terminations are the portions of the sensory nerves most liable to undergo degenerative changes. It is true that our microscopical examination has been limited to the tissues from one of the great toes, but we have not noted any symptoms indicating involvement of the posterior spinal roots. The sphincters were not involved, and sensation was preserved.

The preservation of sensation in the great toe, the nerves of which were so greatly degenerated, is a striking fact. Sensation seems to obey different laws from those on which motion is dependent. The few scattered undegenerated fibres must be regarded as the agents for the transmission of sensation, and it would appear that a few sensory fibres may be sufficient for this transmission. Inasmuch as the portions of the nerves examined were taken from the toe where little or no muscular tissue was present, it seems proper to regard these nerves as almost entirely sensory in character.

Our case is not the only one in which the preservation of sensation has seemed almost inexplicable after a histological examination has been made revealing intense degeneration. Brasch[2] reports such a case and explains the apparent contradiction by the supposition that even the most careful technique will not reveal all the nerve fibres.

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[1] Mitchell. Injuries of Nerves and their Consequences, p. 60.

[2] Brasch. Fortschritte der Medicin, 1898, No. 14, p. 553.

A CASE OF ENDOTHELIOMA LYMPHANGIOMATODES OF THE CERVIX UTERI.[1]

By Hunter Robb, M.D.,
PROFESSOR OF GYNECOLOGY, WESTERN RESERVE UNIVERSITY; GYNECOLOGIST TO LAKESIDE HOSPITAL, CLEVELAND, OHIO.

As is well known, carcinomatous growths of the cervix are comparatively common. On the other hand, endothelioma is sufficiently rare to warrant a careful record of each case observed.

It may not be out of place to refer here briefly to three cases of endothelioma of the cervix, which are the only instances that I have been able to find in the literature.

In 1892 Amann, the younger, in his work on *New-growths of the Cervical Portion of the Uterus* (p. 31), cites a case of tumor of the portio vaginalis which up to that time had not been described. The growth had originated in the deep layers of the cervical mucosa, and had come from the endothelium of the lymph-vessels in this region. Amann was convinced that he was dealing with a genuine endothelioma. Of a supposed second instance of this kind, reported by Pick,[2] in which, however, the main tumor had arisen from the corpus uteri, we shall have more to say in discussing the case reported by Braetz,[3] who claims that his is the second on record. The description of the growth as given by Braetz is almost identical with that to be found in Amann's work. "At the margins of the tumor, in the connective tissue, were numerous anastomosing strands made up of cells inclosing a central cavity. These were made up mainly of large epithelioid cells. The central lumen contained numerous leucocytes, but no red blood-cells. The cell strands were neither externally nor internally sharply bounded by normal endothelium. The flat epithelium on the outer side of the portio vaginalis and the epithelium of the mucous membrane of the cervix and of the glands showed no signs of proliferation."

The lumina between the cell strands in Braetz's case did not show so many leucocytes as in that of Amann. Amann proved conclusively by serial sections that the growth did not come from the epithelium of the portio. Braetz, although in his case complete serial sections were not made, examined a great many sections and did not find in any of them any connection with the epithelium. Braetz acknowledges that his tumor had all the macroscopic appearances of carcinoma, but goes into detail to show that the growth could not possibly have been an ordinary kind of carcinoma. In a similar way he shows that the microscopical appearances would not warrant the view that he was dealing with a sarcoma.

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[1] Read before the American Gynecological Society at Boston, May 26, 1898.

Since this article was prepared for the press there has appeared in the Johns Hopkins Hospital Bulletin for August, 1898, an account of a case operated on by Dr. Kelly for a tumor which had originated in the cervex uteri. Dr. Elizabeth Hurdon, who made the pathological report, comes to the conclusion that this tumor had developed from the endothelium of the lymph spaces. The new growth was characterized by the formation of tubules and cell strands which had followed the course of the bloodvessels. The cells of the growth showed a definite relation to the surrounding stroma cells, while the epithelial elements of the tissue were practically normal.

[2] Archiv für Gynäkologie, 1896, Band xlix., Heft 1.

[3] Ibid., 1896, Band lii., Heft 1.

The tumor described by Pick (according to Braetz) was really a growth from the body of the uterus, which showed in different portions of it very different structures. From his description it must be concluded that the principle portion of the mass is to be regarded as a myoma with carcinomatous degeneration. The lower half of the tumor showed in a connective tissue strands of cells, surrounding a definite lumen, which were made up of large epithelioid cells. These strands showed neither externally nor internally an endothelial covering. Although no leucocytes were demonstrated in the strands, yet from their form and from their relation to the bloodvessels they must be considered as corresponding to lymphatics. Amann was able to show that the proliferation began in the finest lymphatics which were not surrounded by the tumor tissue, and lays stress on this as showing that the proliferation of endothelium was primary. This could not be demonstrated in Pick's case. Here there was undoubtedly a proliferation of the endothelium of the lymphatics, but it is questionable whether such a proliferation deserves the name of endothelioma, since it is found in a diffuse form surrounded by layers of tumor of a different structure. The character of the tumor is determined by the proliferation and change in the muscle elements. In Pick's case, in places the endothelium of the lymphatics had also shared in the proliferation; but the tumor should not, simply on account of the presence of such areas, be regarded as an endothelioma. Such proliferation of endothelium has not infrequently been found in other tumors, without, however, materially altering the character of the tumor.

Braetz agrees with Amann that the portio vaginalis has a distinct tendency to take on an endothelial growth. This also has been recognized by Veit, who says that the primary carcinomatous growths of the lower uterine segment must be reckoned as belonging to a special form of carcinoma.

The clinical history of the case which I wish to report is briefly as follows:

Mrs. B., aged sixty-two years, housewife, mother of five children, the oldest now forty, the youngest twenty-four years of age. Has had no miscarriages. Menstruation began at seventeen, was regular, lasting from five to six days, but generally profuse and painful. The menopause was reached at the age of fifty-three years, but three years later patient noticed that she would have a discharge of blood from the vagina at regular intervals. This afterward occurred irregularly and only occasionally. The family history has no bearing on the case.

Present Illness. In addition to suffering from occasional hemorrhages from the vagina, which have lately occurred only at long intervals, the patient has been complaining for the past three weeks of grinding pains in the lower part of the abdomen which at times become very severe. She is also troubled with a dull pain in the left leg and a great deal of backache. Her appetite is good ; the bowels rather constipated ; there is no trouble with micturition.

On entrance into the hospital the patient weighed 135 pounds, and looked fairly well nourished. The heart, lungs, and kidneys were found to be normal. In connection with the examination of the pelvis and abdomen the following note was recorded :

The vaginal outlet is much relaxed ; the walls are prolapsing ; the cervix, which is deeply lacerated on both sides, is densely infiltrated and flush with the vaginal walls. The uterus is inclined forward ; it is enlarged and not freely movable. No disease of the tubes and ovaries can be made out.

Diagnosis. Malignant disease of the cervix uteri.

Operation. The cervix was thoroughly curetted and cauterized, and a large amount of friable tissue was removed. The operation took place May 29, 1897. The patient made an uninterrupted recovery, and up to the present date (May 20, 1898) no definite signs of recurrence have been noted.

Examination of the Scrapings.[1] Macroscopically, the scrapings resemble those from a carcinoma.

Microscopical Examination. The specimen does not show mucosa; the muscular wall is seen to be invaded by a new-growth. The description will refer (1) to the muscular layer which composes the stroma of the tumor, and (2) to the tumor itself.

Muscular Layer. This appears as bands and nodes of tissue running in different directions between the parts of the tumor proper. The bands and nodes appear now in long and now in cross-section. The nuclei of the fibres are long, thin, and spindle-shaped, such as are seen in smooth muscle. In cross-section the character of the nuclei decides the nature of the cells at once. In many places this stroma of smosth fibres is infiltrated with cells of the young connective-tissue type, rouon and epithelioid cells predominating. The extent and degree of this infiltration are very variable in different parts of the section. Blood-vessels of large size, with well-formed walls, and smaller, cleft-likd openings, without distinct and independent walls, occur in the stroma. Only rarely are the red blood-corpuscles preserved in the sections. Especially noteworthy are the cleft-like spaces, which are very common and show lymphoid cells or desquamated endothelial cells and coagulated (albuminous ?) contents.

Tumor. The larger portions of the sections are made up of the tumor proper. This consists of cells arranged in masses which occupy definite spaces. The cell masses are sometimes solid ; sometimes they show a central space or lumen ; or, again, they show a number of smaller vas-

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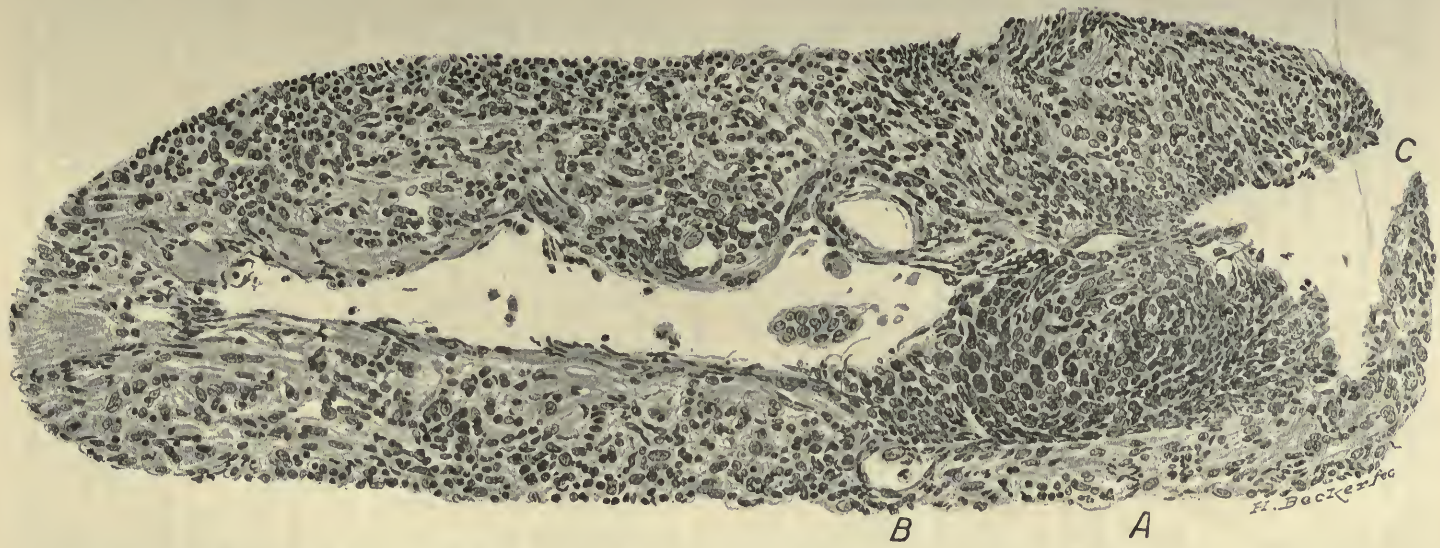
[1] From the pathological laboratory of the Western Reserve University, Cleveland, Ohio.



Large lymph (?) space in muscular wall of uterus, showing the mass of tumor cells almost filling the lumen at *A*; at *B*, less definitely grouped cells and a mass of cells free in the lumen. There is a break in the tissue, accidentally produced, at *C*. The muscle is infiltrated with small cells.

cular clefts. The cells composing the masses are of two principal kinds: (*a*) the predominating cell, oval in shape, possesses a large nucleus, vesicular in form, which contains a nucleolus and one or more chromatin granules. Between these cells there is more or less intercellular substance of faintly granular aspect, which cannot be differentiated from the protoplasm of the cells. No fibres can be made out. Rarely several larger nuclei are massed closely together, giving rise to an appearance of multi-nucleation or giant-cell formation. These cells are in other respects of the same kind as those of the predominating variety. With these are mingled (*b*) cells of a smaller size and of lymphoid type; they are irregularly distributed, but occur in all parts of the tumor.

Some of these tumor cells are undergoing disintegration (fragmentation), and occasionally one of the larger cells shows karyorrhexis.

The relation of the tumor cells to the stroma is very important. Under the low power of the microscope it can be seen that the former do not lie within closed spaces—*e. g.*, alveoli—but that the cell masses ramify in the muscular stroma of the uterine wall. There is considerable complication in the mode of invasion; but in a simple section, and in one plane only, the tendency to run through the stroma is evident, and strands of cells can be followed over considerable areas. The cells do not completely fill the spaces, but leave a light line of demarcation. In other places, however, the separation is not sharply defined, but the outermost layer of cells have attached themselves closely to the stroma. The first few rows of cells next the stroma tend to be placed so that the nuclei are perpendicular to the surface. Beyond this no such regularity is observable.

The cleft-like spaces in the rows of cells are lined with flattened cells resembling those of endothelium. Many of these spaces are narrow and of a diameter which scarcely accommodates more than one lymphoid cell. They appear in cross and longitudinal sections, and possess no proper wall except this lining. Without, they are supported by tumor cells, which are sometimes flattened to the depth of two or three in juxtaposition to the lumen. The extent of these vascular clefts is very variable; many form simply round or oblong spaces (cross-sections?), while others extend a long distance, and wind in and out with the cell masses of which they form the central boundaries. Blood was not discovered in them; although coagulated (albuminous?) contents could be made out. These spaces seem at times to open into the intervals between the masses of cells and the smooth muscle forming the stroma.

Vessels of a somewhat different type appear within the cell masses. These possess a distinct fibrous adventitious coat of slight thickness, although no muscular tunic can be detected. The adventitial coat goes over into the spaces between the adjacent cells.

To return to the clefts among the stroma. These, as has been stated, are lined with cells of an endothelial type. In this respect they agree with certain of the spaces containing strands of tumor cells, while they also correspond in general form to the large spaces. There is therefore a strong suggestion that the strands of tumor cells occupy spaces which have the same origin and nature as the free spaces mentioned, and which, so far at least as the larger and most pronounced ones are concerned, are quite unmistakably lymphatics. If this supposition, then, be correct, the cell masses are contained within lymphatics. Furthermore, the cell masses do not in every instance completely fill the lymphatics; a central lumen is often preserved which agrees in its appearance, lining, and contents with the lymphatic spaces described. What, then, would appear to have taken place is a growth of cells, either originating from the walls of the spaces or invading the latter from outside? The persistence of the lumen favors the supposition that they come from the walls, and are not the result of an invasion from without.

Additional support for this view of the origin of the cells within the spaces is found in the proliferation actually observed to be going on in such a lymphatic in an uninvaded part of the specimen. From this endothelial-lined wall a growth is forming which at this stage is about as large as a miliary tubercle and which projects into and quite fills, so far as its width extends, the lumen of the vessel. On each side the endothelium is preserved, but goes over gradually into the nodule.

From this description it must be concluded that the tumor has sprung from the endothelium lining enlarged and perhaps new lymphatics in the uterine wall. It is therefore proper to designate it an *endothelioma lymphangiomatodes.*

In conclusion, I wish to express my thanks to Drs. S. Flexner, W. T. Howard, Jr., and Walter R. Lincoln for valuable assistance in the preparation of this paper.

TUBERCULOSIS OF THE AORTA.

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Since the classical researches of Weigert,[1] and his pupil Hanau,[2] on the sources of infection in acute miliary tuberculosis there has been abundant evidence that the walls of the veins may become the seat of tubercle, and the work of Koch[3] and others has shown that the smaller arteries are also quite frequently attacked by the tuberculous process. Instances in which the larger arteries, however, and particularly the aorta, have become implicated in the tuberculous process are so uncommon that two instances which have come under our own observation are here reported.

In reviewing the literature bearing on this subject I have been able to find but few reported instances of the condition, and it would seem worth while to give briefly the main points of each of these. The cases are not all of a similar character, as in three of them the involvement of the aorta was due to direct extension from a tuberculous process originating outside of the vessel; while in the others—and my cases are included in this class—the tubercle was probably due to direct implantation of infective material on the vessel-wall.

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[1] Weigert. Virchow's Archiv, Band lxxvii. and lxxxviii.

[2] Hanau Virchow's Archiv, Band cviii.

[3] Koch. Mittheilungen aus dem Kaiserl. Gesundheitsamt, Band ii. S. 26.

The cases in which the aortic process was due to a direct extension are those reported by Dittrich,[1] Kamen,[2] and Sigg.[3] Dittrich's case occurred in a boy, aged twelve years, with generalized miliary tuberculosis following chronic glandular involvement; there was present on the posterior wall of the aorta, a short distance above its origin, a bean-sized adherent lymph-gland, corresponding with which there was present on the intima a small oval defect with somewhat elevated edges. Microscopical examination showed that the two processes were continuous, and that the lymph-gland and vessel-wall both showed the histological elements of tubercle, with the presence of many tubercle bacilli.

Kamen's case, which occurred in a cavalryman, aged twenty-four years, was also due to the adherence of a tuberculous gland to the aorta, with subsequent dilatation and rupture of the vessel at the point of adhesion. The process was shown to be tuberculous microscopically, and tubercle bacilli were present in the lymph-gland, though not made out in the wall of the aorta. Ordinary arterio-sclerotic changes were also present in the affected area. Sigg's case occurred in a male, aged sixty-four years, with old apical and intestinal tuberculosis, acute miliary tuberculosis, and arterio-sclerotic changes in the aorta and coronaries. In this case a portion of consolidated lung, containing a cavity filled with caseous material, was adherent to the aorta, which at this point showed bulging of its wall and a perforation of its coats which, externally, was limited by the caseous material filling the cavity, and internally by a thrombus. The microscopical examination showed the usual elements of tubercle, with giant cells and many bacilli, which were present even in the thrombus covering the internal opening in the aorta.

The second group of cases show quite different characteristics, the tuberculous lesions occurring in the form of nodules springing from the intima and projecting into the lumen of the aorta. Weigert[4] reports two cases, presumably of this character, but gives hardly any detail; one of them, he states, was shown to him by Marchand, while the other, which was observed in his laboratory by Huber, is stated to have shown exquisite tubercular structure, with caseous centre and giant cells. Flexner[5] reports the first case of this kind in which a satisfactory description of the lesion is given. It occurred in a male, aged twenty years, who died of general tuberculosis, probably resulting from a tuberculous process in a pulmonary vein. Two and one-half centimetres below the origin of the subclavian artery there was present on the aortic intima a mass which projected into the lumen of the vessel. It was two and one-half millimetres in length and one millimetre in height at its highest point. The mass had a nodular form, and was apparently made up of several single masses; it was pale and translucent. Microscopical examination showed the nodule to be seated directly on the intima and to consist of several masses separated by connective tissue and having caseous centres. Outside of the caseous material the masses were made up of epithelioid cells, a small amount of fibrous tissue, and many leucocytes. A few giant cells were present, and tubercle bacilli were also demonstrated in small numbers. There were no arterio-sclerotic changes in the aorta in this case. The case of Hanot and Lévy[1] occurred in a man, aged sixty-one years, who died of acute miliary tuberculosis. There was present in the upper part of the thoracic aorta a tubercular nodule; it was single, round in shape, grayish, of firm consistency, and the size of a pinhead. It projected slightly into the lumen of the vessel. The microscopic examination showed a caseous centre and about this tuberculous structure containing a few giant cells. Tubercle bacilli were present in the nodule, but only in small numbers, judging by the illustration which accompanies the article. The middle and external coats were free from evidences of tubercle, and no arterio-sclerotic changes were present. There was a small inflammatory area at one point in the adventitia.

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[1] Dittrich. Prager Zeitschrift für Heilkunde, 1898, S. 97.

[2] Kamen. Ziegler's Beiträge, 1895, S. 416.

[3] Sigg. Beiträge zur Lehre der Acetun Miliartuberculose. Inaug. Discuss. Zürich, 1896.

[4] Weigert. Virchow's Archiv, Band lxxxviii. S. 360.

[5] Flexner. Johns Hopkins Hospital Bulletin, 1891, p. 120.

Stroebe's[2] case is reported as one of tuberculous aortitis, but from his description it would not seem to differ materially from those already cited. The deeper parts of the intima seem, perhaps, to have been more involved than in Flexner's or Hanot and Lévy's cases. In this case there was present in the ascending aorta, two centimetres above the sinus of Valsalva, a small excrescence seven millimetres in height and three to four millimetres in thickness. It was irregular and nodulated and had a pedunculated character, the outer enlarged portion being covered by a partly organized and partly fresh clot. Histological examination showed the nodule to be made up peripherally of epithelioid cells and polynuclear leucocytes; centrally, of caseous material; the apex was capped by a partly organized clot. Numerous tubercle bacilli were present in the nodule and extended to its periphery in one place so as to be in actual contact with the blood-stream. The media and intima were unaffected except that in the neighborhood of the tuberculous process a portion of the media was necrotic, and there were collections of polynuclear leucocytes in the neighborhood of the vasa vasorum. No arterio-sclerotic changes were present in the vessel wall. Stroebe, in his paper, includes among probable cases of the affection that of Zahn,[1] which was described as a case of aortitis verrucosa; Marchand also believes this to be a case of aortic tuberculosis. Zahn himself, however, who was present at the demonstration of Stroebe's specimens at the Brunswick Naturalists' Society, states flatly that the case was not one of tuberculosis, and hence we will not include any description of it.

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[1] Hanot and Lévy. Archives de Médecine Expérimentale, 1896, p. 784.

[2] Stroebe. Cent. für allg. Path. und Path. Anat., 1897, S. 998.

Of my own two cases, the first was observed in the Pathological Laboratory of the Johns Hopkins University and Hospital, and I am indebted to Prof. W. H. Welch for permission to report it; for the second case I am indebted to Dr. George E. Gorham, of Albany, N. Y., in whose practice it occurred.

Case I.—Colored man, aged forty-five years. The anatomical diagnosis was as follows: Chronic tuberculosis of the peritoneum; acute miliary tuberculosis of the lungs, liver, spleen, kidneys, intestine, adrenals, pancreas, trachea, bronchi, epididymis, testicle, bladder, brain membranes, bone-marrow, and aorta; cloudy swelling of the liver and kidneys; arterio-sclerosis; slight coronary artery disease; slight chronic interstitial myocarditis.

The following are the notes on the aorta:

Macroscopical. The aorta shows a patchy atheroma throughout in a moderately advanced fatty stage. In the descending aorta three nodules are to be seen, all of them apparently below the diaphragm; two of them appear as pinhead-sized, gray, translucent nodules projecting above the surface of the intima and sharply localized; the third one has a yellowish tinge, is slightly larger, and is apparently situated in the vessel-wall.

Microscopical. Each nodule appears as a small, rounded elevation seated on the intima of the aorta. The endothelium covering the intima can be traced as far as the projecting nodule, but does not extend over this. The intima does not show any thickening where the nodule occurs, but in other places in the section it is distinctly thickened and, in its deeper portions is at times devoid of nuclei, and evidently necrotic. The nodule affects only the most superficial layers of the intima; in fact, it has almost the appearance of being stuck on to its inner surface. The parallel arrangement of the intimal nuclei can be traced even in its most superficial parts under almost the entire area involved by the nodule; only at one end is there slight cellular infiltration affecting the superficial intimal structure. The media shows in places slight changes in the form of an infiltration of round cells between the muscle cells in the neighborhood of the vasa vasorum; these changes are most marked in the portions of the media lying beneath the thickened areas in the intima.

The nodule mentioned above is made up almost entirely of cells of the epithelioid type, with long or irregular-shaped nuclei. The central portion is almost free from nuclei and has the usual appearance of caseous material. An occasional cell, with a round, darkly-staining nucleus is seen in the portion of the nodule next to the intima, but no such cells are to be made out in the portion next the blood-stream. No definite giant cells are seen, though in one or two places there are clumps of epithelioid nuclei suggesting their formation. No remains of blood-pigment are seen in the nodule. Sections stained with carbol-fuchsin and decolorized with acid alcohol showed a few tubercle bacilli. The lymph glands in the immediate neighborhood contain definite caseous tubercle nodules, with giant cells, but are nowhere adherent to the aorta.

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[1] Zahn. Virchow's Archiv, Band lxxii.

Case II.—White woman, aged fifty years. The anatomical diagnosis was as follows: Old caseous tuberculous focus at the apex of the right lung, with softening, miliary tuberculosis of both lungs and the peritoneal covering of the spleen; miliary tubercles of the spleen and liver; acute swelling of the spleen; caseous tuberculosis of the kidneys; fresh tuberculous ulcers in the stomach and ileum; tuberculosis of the descending aorta.

The following is the abstract from the protocol referring to the aorta:

Macroscopical. At one point in the descending aorta there is present a small, pinhead-sized excrescence. It is rather firm in consistency, gray and translucent in appearance and with a finely-lobulated surface, being apparently formed by the growing together of three or four small circular nodules. It springs from the intima by a moderately broad base, but is slightly constricted at a short distance from its origin, which gives it a polypoid appearance. The aorta shows a number of patches of fatty and calcareous atheroma.

Microscopical. The excrescence described in the naked-eye description is seen as an irregular elevation on the intima. The elevation springs from a broad base and varies in shape in different sections. In some it is rounded, but in others shows definite excrescences corresponding to those seen with the naked eye. It is made up of a cellular and a necrotic portion. The cellular portion is situated at the periphery of the nodule, and is made up almost exclusively of irregular cells of an epithelioid type. In places in this portion an occasional small round cell is seen, and in one section a typical giant cell is present. The entire periphery of the nodule is not equally cellular, for while there are many cells in the portions of the periphery abutting on the blood-stream, the portion lying against the intima shows only a very few epithelioid cells lying in the innermost portions of this coat; in fact, the intima seems scarcely at all invaded, and the nodule in this, as in the previously described case, has almost the appearance of having been stuck on to the intima. The central portion is almost free from nuclei, contains a few nuclear fragments, and has the usual appearances of caseous material. The epithelial layer of the intima apparently stops short at the nodule, and does not cover it. The intima is apparently not thickened beneath the nodule, nor does it show any thickening elsewhere in the specimen. The media and adventitia show no changes. Sections stained with carbol-fuchsin and methyl-blue show innumerable tubercle bacilli in the cellular portions of the nodule (a few in the caseous portion). They have no definite arrangement. Nothing resembling altered blood-pigment is to be seen in the nodule.

Aside from the extreme rarity of the lesion, the last group of cases are of interest with regard to the method of origin of the tubercles. It may be assumed that tubercles of the aorta can arise either by direct transplantation of infective material from the blood-current or from the entrance into the vasa vasorum of tubercle bacilli. The probability of the latter mode of origin is almost certainly negatived in all of the reported cases belonging to this class by the situation of the lesion; in all but one of the cited instances the media did not show any changes that could be regarded as tuberculous in nature, and in Stroebe's case there was only a slight amount of necrosis of the innermost portion of this coat. According to the observations of Plotnikow,[1] the vasa vasorum of the aorta extend only half-way into the media from its external surface, so that the possibility of infection in this way in these cases is very slight. An origin from infective material carried in the blood-stream seems much more probable in all these cases; in our two cases the most striking thing in the sections was the extremely slight involvement of even the most superficial layers of the intima, the tubercles looking almost as if they had been stuck on to this coat, so slightly was it affected; the illustration in Hanot and Lévy's case would lead one to suppose that here, also, only the superficial portions of the intima were affected, and the description in Flexner's case gives one the same impression. The method of infection here is probably similar to that which occurs in some forms of endocarditis and aortitis. The experiments of Ribbert,[2] of which Stroebe speaks, show that, in the case of the endocardium, infection of the valves can take place without any previous disease or traumatic influence, though in these experiments foreign bodies in the shape of fine particles of potato were introduced into the circulation with the bacilli. In the experiments of Boinet and Romary,[3] these authors were at times able to set up changes in the aorta resembling arterio-sclerosis by the mere injection of bacteria, without accompanying trauma or the presence of foreign particles. It is presumable that the pre-existence of some lesion of the intima would favor the development of the tubercles, though there was no apparent indication that such changes were present in any of the cases under discussion. The fact that the existence of a previous lesion may favor the development of tuberculosis is shown by the case of Cordua,[4] where an œsophageal carcinoma became infected with tuberculosis, and the case of Breus,[5] where both gastric and œsophageal cicatrices became similarly infected. The occurrence of arterio-sclerosis in connection with the tuberculous lesion in some of the cases is certainly suggestive in this connection; but in several of the cases the individuals affected were very young and showed absolutely no change in the vessel-walls, while in other cases, as in our own, though arterio-sclerosis was present in the vessel-wall in places, none was to be observed in the immediate neighborhood of the tubercle nodules. It is conceivable that in cases of this sort, in which large quantities of bacterial toxins are circulating in the blood-stream, these might be able to cause localized areas of lessened resistance in the vessel-wall and prepare it for the lodgement of the tubercle bacillus. That bacterial toxins, without the presence of the bacteria themselves and without accompanying traumatism, are well able to cause changes in the aorta is shown by the researches of Boinet and Romary,[1] who were able to produce definite lesions by the injection of the toxins of tetanus and of diphtheria. Direct infection from the lymph vessels is hardly to be thought of, the current being in the wrong direction to convey infection from the neighboring glands, and the vessels in all probability reaching only the same distance into the vessel-wall as do the bloodvessels—*i. e.*, to the middle of the media.

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[1] Plotnikow, cited by Stroebe.

[2] Ribbert. Fortschritte der Medicin, 1886, S. 1.

[3] Boinet and Romary. Archives de Médecine Expérimentale, 1897, p. 902.

[4] Cordua. Arbeiten a. d. patholog. Institut in Göttingen, 1893.

[5] Breus. Wiener med. Wochenschrift, 1878, No. 11.

The possibility of these tubercle nodules being due to the invasion of small parietal thrombi by the tubercle bacillus must be thought of, as invasion of thrombi by tubercle bacilli has been observed in connection with heart lesions in some instances; but in none of the reported cases was there evidence to support this theory. In Stroebe's case there is distinct mention made of the fact that nothing like changed blood-pigment was present in the tubercle nodules, nor could we find any evidence of such in our cases. The presence of a small amount of fibrin in the tubercles, such as occurred in Stroebe's cases, is no evidence of thrombotic origin, for Falk[2] has shown that a fair percentage of tubercles contain fibrin at some stage in their development. The results of the experiments of Boinet and Romary on the production of aortic inflammatory lesions lead us to hope that in the future the origin of aortic tubercles may be made clearer by similar methods.

COMBINED TYPHOID AND MALARIAL INFECTION.

REPORT OF A CASE AND REVIEW OF THE LITERATURE, WITH SPECIAL REFERENCE TO THE SO-CALLED TYPHO-MALARIAL FEVER.

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For the past half-century there has been much controversy among medical men on the question of the coexistence of typhoid and malarial infection in the same subject and the clinical picture resulting. The various theories that have been advanced on this subject are too many and diverse to enumerate. So long as the exact cause and nature of both diseases were unknown it is natural that little headway could have been made in solving the problem. To-day, however, with the cause and nature of each of these diseases established and resting on scientific demonstration, we should expect that the question of the coexistence of the two diseases would have been solved beyond controversy. This, however, is not the case, and almost as much uncertainty exists as formerly. Few of the cases clinically diagnosticated as combined typhoid and malarial infection, *typho-malarial* fever, etc., have been studied by modern laboratory methods of scientific research. It is clear, however, that until such exact methods of study shall be generally employed the subject of discussion will remain open.

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[1] Boinet and Romary. Archives de Médecine Expérimentale, 1897, p. 902.

[2] Falk. Virchow's Archiv, Band cxxxix. S. 339.

It is my purpose in the present article to collect from the literature and present, in abstract, such cases of combined typhoid and malarial infection as have been studied by the best methods of modern investigation, and to draw from these cases evidence on the nature and general clinical picture of such combined infections. I shall pay special attention in this brief survey to the subject of the so-called *typho-malarial* fever. For the purpose of this study I have accepted such cases only as meet the following requirements:

1. That typhoid fever and malarial fever coexist in the same individual.

2. That this coexistence be shown (*a*) by the discovery of the parasites of malarial disease in the blood, and (*b*) by strong evidence, clinical, pathological, bacteriological, etc., of true typhoid fever.

I have been able to collect from the literature twenty-nine cases meeting these criteria, to which I shall add one case that has been under my care recently in the Johns Hopkins Hospital, in Dr. Osler's service. In all, then, I shall present brief notes of thirty cases of true combined typhoid and malarial infection. I shall refer, also, to other cases, presumably combined typhoid and malarial disease, described in the literature, but not meeting the above requirements.

The case that I have had under my observation and charge in the Johns Hopkins Hospital is as follows:

H. B., male, aged forty-eight years, a carpenter, entered Johns Hopkins Hospital, Baltimore, January 5, 1898, complaining of "chills and fever." Hospital No. 21,646.

While working at Hawkins Point, on Chesapeake Bay, a few miles from Baltimore, he had three successive attacks of "chills and fever," occurring respectively in June, August, and October, 1897. The chills were typical, severe, and shaking, lasting from one to two hours, and required him to stop work for about two weeks during each of the periods mentioned. He took quinine irregularly during each attack, not between the attacks. He lost thirty-five pounds in weight between his first attack of malarial fever, in June, and the beginning of his present illness, in December, and during this whole period felt weak and ill.

The first symptoms of his present illness date from December 18th, and from this date until his admission, on January 5th, he had daily chills, slight and confined to his back. Headache accompanied the chills, and sometimes backache and nausea. Vomiting occurred once, on December 19th. There were no sweats, cough, nor epistaxis. The bowels were regular. Quinine was taken regularly three times daily. He took to bed January 2, 1898.

On admission, January 5th, his condition was as follows: Temperature, respiration, and pulse normal; tongue dry and coated; lungs negative except for a few crackles at the left base; a soft systolic bruit at the heart's apex; liver and spleen both enlarged and felt just below the costal margin, and tender on palpation; abdomen full and rather tense, but not tender; no gurgling in iliac fossæ; a few rose-spots on the abdomen; bowels constipated; Ehrlich's diazo-reaction in the urine; no malarial organisms in the blood; Widal's serum reaction not present.

During the forty-eight hours following admission two suspicious febrile paroxysms occurred without chills or sweating, but accompanied by headache. Repeated examinations of the blood for malarial parasites were negative. After the first forty-eight hours the temperature assumed a typical typhoid course, which was maintained throughout until convalescence. Quinine was not given, except as hereafter stated. The course of the typhoid fever was characteristic and of average severity. The bowels were constipated throughout. Numerous rose-spots appeared over the trunk, arms, and legs. The Widal serum reaction developed, and was positive. The leucocyte count was characteristic, falling to 4000. Blood cultures taken on several occasions proved negative, as also cultures from the feces, so far as the differentiation of the bacillus typhosus is concerned. The temperature reached normal on the thirty-first day of the disease (dating from the time the patient took to bed), and the patient entered upon convalescence.

After nine days of normal temperature a febrile paroxysm developed, without chill or sweating. A second similar paroxysm occurred two days later, and a third paroxysm two days after this. The blood was examined during the third paroxysm, and showed numerous full-grown pigmented tertian malarial organisms and a few young hyaline forms in the red blood-corpuscles. Extracellular pigmented forms and pigmented leucocytes in active amœboid movement were observed later in the day. On the following day a few full-grown organisms were observed, and a day later stray pigment granules in the serum. Quinine was given in large doses at the time of the first discovery of malarial organisms, and was continued until the patient's discharge. After the third paroxysm no further evidence of malarial fever was seen, and the patient was discharged, well, February 24th.

To summarize briefly: this case had successive attacks of malarial fever in June, August, and October of last year, imperfectly treated with quinine. Between these attacks, and following them, the patient lost weight, had little appetite, and was weak. The malarial infection was probably present throughout and dormant in the intervals. The repeated daily chills that occurred from December 18th to January 5th were probably, but not surely, malarial. It is possible that they were merely the initial chills[32] sometimes seen in typhoid. The febrile paroxysms seen on the patient's admission may possibly have been malarial in origin, though the negative results of repeated blood examinations make this very doubtful. At any rate, the malarial organisms showed no further influence on the course of the typhoid fever until convalescence had been well established. The course of the typhoid was typical and of at least average severity. Malarial paroxysms occurred during convalescence and yielded promptly to the action of quinine, and the patient quickly recovered. It is to be noted also that for eighteen days prior to admission the patient had taken quinine three times daily.

The cases furnished by the literature,* twenty-nine in number, are as follows:

	Cases.	Mortality.	Per cent. mortality.
Osler	1	0	0.0
Da Costa	1	0	0.0
Kinyoun	5	2	40.0
Thompson	3	0	0.0
Laveran	2	0	0.0
Vincent	17	8	47.0
	29	10	34.4

Osler's [28] [29] case. The patient was admitted to the Johns Hopkins Hospital October 16, 1891. (Hospital No. 4051.) During the sixteen days prior to admission the patient had had headache and cough, occasional epistaxis, and three chills. On admission the temperature was 100° F., falling to 96° F. at midnight. "The blood on the 17th showed fairly numerous, non-pigmented, intracellular, hyaline bodies." Quinine was begun. At 12 M. on the 17th the temperature began to rise, and at 3.30 P.M. the patient had a chill, after which the temperature rose to 104.2° F., falling to normal at 12 M. on the 18th. During the next several days there were slight oscillations in the temperature, which remained nearly normal. "The last malarial organism seen in the blood was an ovoid body, with coarse pigment granules, which was seen on the 23d." The temperature began to rise on the 22d, reaching 104.8° F. at 4 P.M. on the 23d, the beginning of a long, severe attack of typhoid fever. Quinine was discontinued on the 26th. The course of the typhoid fever was typical, but of great severity, the temperature not falling to normal until between the fifth and sixth weeks. Rose-spots developed during the course. The patient had in all sixty-eight baths. No further evidence of malaria appeared, and the patient was discharged, well, on January 19th. (The temperature-chart is produced in full.)

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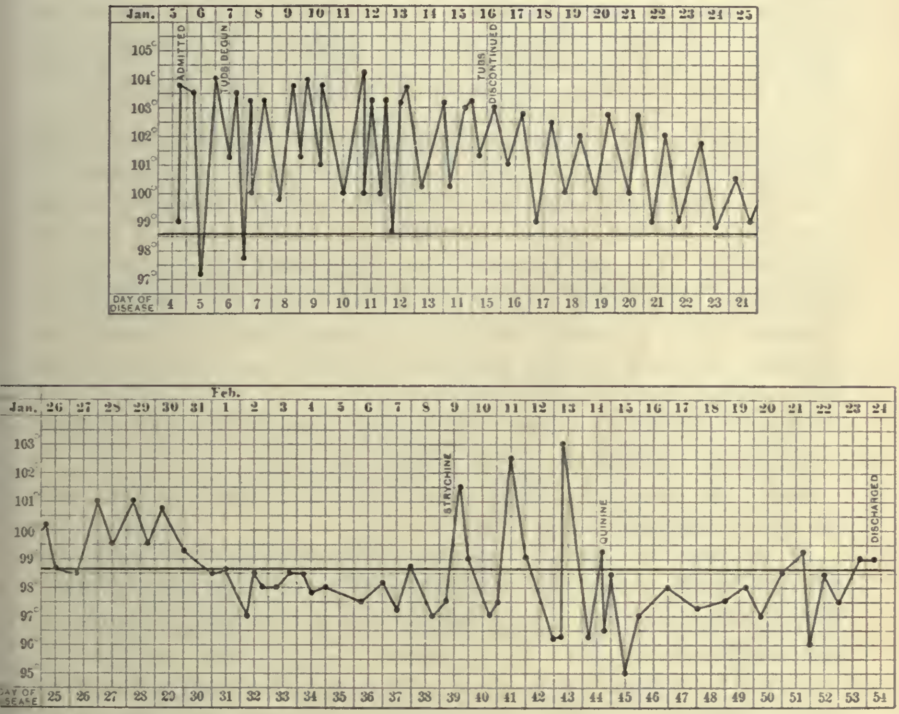
* Anders'[35] cases are omitted from this enumeration, because no record in detail of the cases has been published. In a letter to the writer, however, Dr. Anders states that "tertian malarial organisms were noted in five" of the eight cases, and that "in two out of the five cases in which malarial micro-organisms were found, distinctive and conclusive evidences of typhoid fever were furnished by my notes, such as enlarged spleen, characteristic eruption, the characteristic temperature-curve, peculiar nervous symptoms, etc."

TEMPERATURE-CHART.



Admitted January 5th, on fourth day of disease. Tubs begun on January 7th, and discontinued January 16th. Strychnia sulph., gr. 1/60, twice daily, begun February 9th and continued until discharge. Quinine sulph., gr. v t. i. d., begun February 14th and continued until discharge, on February 24th.

Da Costa's[38] case. Patient entered hospital November 9th. About three weeks before, patient began to have headache, backache, and paroxysms of chill, high fever, and sweating, occurring on alternate days. These paroxysms continued to occur for two weeks. The week before admission diarrhœa began and the fever became persistent, accompanied by slight cough, loss of flesh, and weakness.

After admission the patient had no chills, but had a "continued fever, which exhibited the features of typhoid." The temperature-curve for the first few days showed marked irregularity. On admission the temperature was 97° F., rising to 102° F. during the day, declining to 100° F. on the next morning, and again rising by evening to 103.8° F. On the day following the morning temperature was 100.6° F. and the evening temperature 103.2° F. After this the temperature showed less irregularity. The clinical picture was characteristic of typhoid, and a large number of rose-spots appeared. Convalescence became established, and recovery followed. The blood examination (at what time made, not stated) showed "marked brown pigmentation, and with these masses there were various forms of malarial organisms, though not the crescentic forms. The white corpuscles contained a great deal of pigment, irregular in shape; there was none in the red cells. On the whole, the evidence of malaria in the blood is striking and unquestioned."

(In a personal communication to the writer Dr. Da Costa states that the above description of the parasites is inaccurate, and that pigmented hyaline organisms were found in the red blood-corpuscles.) The temperature-chart of the case is published. Quinine was administered.

Kinyoun's[21] cases. Kinyoun studied the cases of malarial fever and typhoid fever at the New York Marine Hospital for the presence of malarial organisms in the blood and the bacillus of Eberth in the spleen and intestinal canal. More than one hundred cases of malaria were studied. The writer does not state the number of cases of typhoid fever seen. All of these cases were in sailors coming from the Southern States and from Virginia in particular. Among these he observed five instances of mixed typhoid and malarial infection. He divided his cases clinically into two groups, as follows:

Group I., including "cases in which the symptoms of malarial fever predominate, masking the enteric lesion," two cases.

Group II., including "cases in which the symptoms of enteric fever are most prominent," three cases.

In all cases the malarial organisms were found in the blood and Eberth's bacillus in the spleen or intestinal canal. The types of malarial organisms observed are not mentioned, and temperature-charts are not reproduced.

Case I.—Two days before admission patient had a chill, followed by fever marked by a remission; on day of admission chilly sensations, with a rise in temperature, followed by remission. The blood examination showed a large number of the "plasmodia malariæ, found both in the serum and within the blood-corpuscles" The epigastric region showed tenderness and the spleen was considerably enlarged. "On the fifth day after admission there appeared on his abdomen several suspicious-looking spots suggestive of enteric complications. On the day following he had slight epistaxis and a tendency to diarrhœa, tenderness in the right iliac fossa." At this time "a bacillus answering to the description of that described by Eberth was isolated from the stools," and the blood examination still showed "the malarial parasites, in greatly diminished numbers, confined to the corpuscles." During the next week the entire symptoms became marked, the remissions in the fever ceased, and the temperature-curve was characteristic of typhoid fever.

Case II.—The symptoms were not so pronounced as in the first case, but, on the whole, the case did not differ from the first. "The plasmodium malariæ was found in the blood in abundance, and later the typhoid bacillus was isolated from the stools."

Group II., three cases. "The enteric symptoms were well marked, giving a clear history of the disease. The history gave the prodromal period, lassitude, etc., followed by diarrhœa, epistaxis, and tympanites, and in one case slight hemorrhage." The "malarial parasite" was found "confined to the corpuscle, not free in the blood serum." The typhoid bacillus was isolated in every case. In one case during the third week in convalescence, with normal temperature, a rise of temperature to 39° C. occurred, lasting four hours. Twenty-four hours later a similar rise of temperature occurred. The blood was examined and the "plasmodium" was found. Antiperiodic treatment was employed for a few days, and the case went on to speedy convalescence.

The two other cases of this group terminated fatally, one by peritonitis following perforation, and the other by pneumonia.*

Thompson's[26] cases. CASE I.—Patient denied having had ague; developed typhoid fever, which began typically, without any suggestion of malarial complication. Numerous rose-spots developed in successive crops. The disease pursued a prolonged course, with very severe and grave symptoms. On the thirteenth day a severe chill occurred, accompanied by a temperature of 106.6° F., without sweating. The blood examination showed malarial organisms "in exceptionally large numbers, invading the red blood-corpuscles and also independent of them." Quinine was administered. During the third week two similar paroxysms occurred, and quinine was again employed. No further manifestations of malaria appeared, and the case terminated with recovery. The temperature-chart is given.

CASE II.—Two weeks before admission patient had had five or six severe chills, accompanied by nausea, vomiting, slight diarrhœa, fever, and severe frontal headache. On admission unmistakable signs of typhoid fever were present, including many rose-spots on the chest, abdomen, and back. The urine showed the diazo-reaction. The disease ran a typical course of average severity. In all, thirty tubs were given. Defervescence became established on the thirty-first day. After seven days of normal temperature three quotidian paroxysms of chill, high fever, and profuse sweating occurred. Malarial organisms in abundance in the blood were found. Quinine was given. The patient showed no further evidence of malaria, and in a few days was discharged, cured. The temperature-chart is given.

CASE III.—Patient admitted on nineteenth day of illness, with all the signs of well-established typhoid fever. There was a distinct eruption of rose-spots on the abdomen and thorax. The course of the fever was of average severity, and the patient received in all twenty-one baths. Defervescence was established on the thirty-third day. After eight days of normal temperature two quotidian paroxysms of chill, high fever, and sweating occurred, and quinine was administered. The blood was not examined until twenty grains of quinine had been taken, and then showed no true malarial organisms, but "abundant malarial pigment granules were contained in the blood-cells." Recovery immediately followed. The temperature-chart is given.

(This case is included in our enumeration of cases on the evidence of the presence of malarial pigment contained in the blood-cells following the febrile paroxysms, despite the fact that living organisms were not found.*)

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* A full report, presumably of this case, is published in the "Annual Report of the Supervising Surgeon-General of the Marine Hospital Service of the United States," Washington, 1890, p. 187.

Laveran's[18 43] cases. CASE I.—Patient entered the hospital at Constantine, Algeria, August 2, 1882. Diagnosis on admission, typhoid fever. In March, 1881, patient had had a fever lasting three days, with herpes labialis. The fever disappeared without the use of quinine.

July 31, 1882. First symptoms of present illness; general malaise, general weakness, headache, burning thirst, and fever with chill. Fever persisted without marked remission until patient entered hospital, and continued also after admission, without remission. Typical symptoms of typhoid fever developed, but rose-spots never appeared.

August 11*th*. Fever began to subside.

20*th*. Defervescence complete and convalescence begun. The temperature had been typical of typhoid.

29*th*. Patient complained of chill, and said that for several days he had had a chill in the evening; evening temperature 39.5° C.

30*th*. At 8 A.M. the blood examination showed various forms of malarial parasites in large numbers; temperature about normal; quinine was begun; evening temperature 38.5° C.

31*st*. Apyrexia; parasites in the blood in reduced numbers; quinine continued.

September 5*th*. There has been no further evidence of malaria; patient discharged, well.

(The temperature-chart is not given.)

CASE II.—Patient entered the hospital at Constantine, Algeria, January 25, 1883, complaining of intermittent fever. Patient had been in the hospital at Philippeville in August, 1882, for twenty-three days, with intermittent fever; no return of fever until January 20, 1883.

January 20*th* to 24*th*. Quotidian paroxysms of fever with initial chill regularly at 2 A.M.

24*th*. Morning temperature, 40.2° C.; evening temperature, 38.9° C.; anæmia well marked, earthy hue of face, mucous membranes pale, general thinness and feebleness, anorexia, tongue fair; blood examination showed malarial parasites and pigmented leucocytes; quinine begun.

25*th*. Morning temperature, 38.2° C.; evening temperature, 38.4° C.; anorexia.

25*th*. Apyrexia.

27*th*. Apyrexia; no organisms in the blood.

February 4*th*. Quinine discontinued.

8*th*. Patient complains of not sleeping, and general malaise and headache for the past few days; no chills; morning temperature, 39.5° C.; evening temperature, 40.6° C.; blood examination negative; quinine begun.

9*th*. Morning temperature, 39.7° C.; evening temperature, 39.9° C.; general symptoms of typhoid fever.

10*th*. Morning temperature, 39.6° C.; evening temperature, 40.1 C.; typhoid state pronounced.

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* In a letter to the writer dated February 22, 1898, Dr. Thompson states that he has notes of several other cases of double typhoid and malarial infection that have recently occurred in New York, and that he has heard of the occurrence in New York of several cases more.

11*th*. Morning temperature, 39.3° C.; evening temperature, 40.3° C.; rose-spots on abdomen; quinine discontinued.

15*th*. Defervescence begun.

18*th*. Blood examination negative.

20*th*. Defervescence complete—*i. e.*, on the seventeenth day of the typhoid fever; apyrexia persisted until

March 8*th*. Chill; temperature, 40.3° C.; blood examination showed malarial parasites.

9*th*. Apyrexia; quinine begun.

14*th*. Apyrexia has persisted; no further evidence of malaria; quinine discontinued.

15*th*. Patient discharged, cured.

(Temperature-chart not given.)

(Laveran describes several other cases[18 43] that were undoubtedly combined malaria and typhoid, as shown at autopsy, but they cannot be accepted in this enumeration, as they either occurred before the discovery of the malarial parasite or there is no note of the presence of the parasite in the blood.)

Vincent's[33] cases. Vincent, a French army surgeon, at the bacteriological laboratory of the Hospital du Dey, in Algeria, encountered seventeen cases of combined typhoid and malarial infection, which he called "fièvre typho-palustre." Sixteen of these cases were in soldiers from Madagascar and one in a soldier who contracted the disease in Algeria.

The clinical symptoms of the disease varied considerably between those of typhoid and those of malaria, but in a majority of the cases the symptoms of typhoid dominated the picture.

The first manifestations of the infection consisted in an initial rise of temperature, almost always rapid, sometimes abrupt, resembling malaria, with or without a chill, severe headache, general body pains, and sometimes epistaxis. Once established, the fever persisted, often irregular and capricious in its course, or higher in the morning than in the evening. Sometimes the initial fever was only transitory, and was followed by an almost normal temperature during the course of the disease, interrupted by an occasional high rise. The latter type was observed twice.

The pulse-rate followed the oscillations of temperature, remaining high in the intervals. It not rarely varied between 130 and 150, or more, to the minute. It was dicrotic, compressible, sometimes very small, and was accompanied by cardiac irregularities, etc.

Profound stupor, delirium, excitement alternating with depression, earthy hue of face, dusky, dry lips, teeth, and tongue, intense albuminuria were seen in all the cases, indicating the gravity of the infection. Death, following severe symptoms, occurred in some cases in the first week.

Thoracic complications (bronchitis and lobular pneumonia) were almost constant. Rose-spots were present in twelve of the seventeen cases. The right iliac fossa was tender on pressure. Constipation sometimes occurred, generally, however, diarrhœa, yellow and of fetid odor. In one case death followed choleriform symptoms. Two cardinal symptoms were always present: the earthy hue of the face and the enlargement of the spleen. Tenderness over the liver was also present. Death was often due to complications, such as myocarditis, parenchymatous nephritis, gangrene of the lung, lobar pneumonia, abscess of the kidney and the spleen, peritonitis, etc.

The convalescence was slow, establishing itself at the end of the third or fourth week, and often, during this period, isolated febrile paroxysms occurred. All cases were given large doses of quinine.

Pathological. In all cases the blood was examined during life and to the end of the infection, and malarial parasites (amœbæ, segmenting forms, and crescents) were found, except in one case in which, at autopsy, the parasites were found abundantly in the spleen.

Eight of the seventeen cases terminated fatally. In all the fatal cases, at autopsy, tumefaction and ulceration of Peyer's patches in varying degrees were noted. These lesions were often very small. The mesenteric glands were hypertrophied. The spleen was always enlarged, in one case weighing nine hundred grammes, and the surface had the color of graphite. The liver was hypertrophied, soft, and brown in color. The kidneys showed the characteristic lesions of parenchymatous nephritis. Microscopic examination of the liver and spleen showed melanosis. Sections of the spleen showed a number, sometimes considerable, of the organisms of malaria, especially the crescents. Cultures from the spleen were carefully studied and showed a bacillus presenting the morphological and biological characteristics of the *bacillus typhosus* of Eberth.

Vincent concluded, " from the anatomico-pathological changes which are found in the fièvre typho-palustre, and especially from the result of bacteriological and microscopical examinations of the blood and viscera, we believe that we may conclude that the syndrome studied is no other than a mixed infection due to the association of the bacillus typhosus and the pathogenic agent of paludism."

A separate narration of cases is not given, but four temperature-charts are given, showing as follows:

1. Abrupt rise of temperature from 36.1° C. on the first day to 40° C. on the second, falling to 39.1° on the third day, with death on the fourth day.
2. Temperature-curve most irregular, with three tertian paroxysms during the course, followed by death.
3. Temperature-tracing in general close to normal, with acute paroxysms occurring on the second, third, twelfth, and thirty-second days of the disease, with death on the thirty-ninth day.

4. Quotidian paroxysms of temperature on the fifth, sixth, seventh, eighth, and ninth days, with death on the tenth day.

Having now passed in review these thirty cases of combined typhoid and malarial infection, we shall attempt to derive from them what information they afford on the subject of the so-called *typho-malarial* fever.

The existence of mixed forms of intermittent and typhoid fever has been noted at various times by many writers. In 1781 Burserius[1] described them under the group-name "the proportionata." Hermann Schmidt[2] in 1830 described them, and divided them into two groups, viz., (1) "typhus intermittens subintrans," in which the typhoid element predominated, and (2) "febris intermittens typhosa," in which the intermittent fever was predominant. In Italy, Maillot[3] described them in 1836, and Felix Jacquot[4] in 1851. In the United States, Drake[5] observed the double infections before 1854, and designated them "remitto-typhous." Dickson[6] referred to them in 1855, and Levick[9] in 1863 gave them the name "miasmatic-typhoid fever." Many other references[11 13 15] to these mixed infections are found in the literature of different countries.

The term *typho-malarial* fever was introduced in the United States in 1862 by Woodward,[7 8 10 17] a surgeon in the army, who encountered in his service in the field during the war cases of fever which presented a clinical picture typical neither of typhoid fever nor of malarial fever, but apparently a compound of both. This fever he called *typho-malarial*, and on his suggestion this term was introduced by the Board of Medical Officers[17] in the blank forms of the monthly sick-reports of the army. As a result of the introduction of the new term in the army there were reported to the office of the Surgeon-General[14] during the war 57,400 cases of this disease, with 5360 deaths.

The new disease-name was quickly adopted and became general in the United States, and found its way into local health-board reports and eventually into many of the standard text-books of medicine, such as Flint, Loomis, Clymer, etc. It met with strong opposition,[12 16] however, in many quarters. Among French writers the disease was called by various terms, such as "fièvre typho-malarienne," "fièvre typho-malariale," "fièvre typho-palustre," "fièvre typho-paludéenne," "fièvre proportionnée typhoïdique," etc.

In 1876, at the meeting of the International Medical Congress in Philadelphia, Woodward[17] read a paper on the nature of "typho-malarial" fever, and, at this time, took the ground that it was a *hybrid* disease produced by the concurrent action of malarial and typhoid infection, and, on his motion, the following definition was adopted as expressing the opinion of the Section on Medicine: "Typho-malarial fever is not a specific or distinct type of disease, but the term may be conveniently applied to the compound forms of fever which result from the combined influence of the causes of the malarious fevers and of typhoid fever." This definition of "typho-malarial" fever is the one most generally accepted to-day by the advocates of the existence and prevalence of such a disease. But it is not to be understood that all physicians using this term have any such exact idea of its nature as is indicated by the above definition. The term "typho-malarial" fever, as Woodward pathetically remarked, has been used extensively by many physicians to denote any obscure febrile affection which offered diagnostic difficulty. The term is very widely employed in the Southern States, and is very common in the North as well.

Accepting, then, this definition of "typho-malarial" fever, what is the clinical picture of the disease? Its advocates[25] in America, as a rule, state that it is a prolonged fever, exhibiting typhoid characteristics, and ushered in and often accompanied during its course by repeated paroxysms of chill, high fever, and sweating. The onset of the disease is more abrupt than that of simple typhoid fever, and its termination is often by crisis. Bilious symptoms are frequent. Jaundice, or an icteroid hue of the skin, is more common. Abdominal tenderness, distention,. etc., are usually present, though often slight. Diarrhœa may or may not be present. Rose-spots seldom develop. The course* of the fever is shorter and markedly milder than that of typhoid fever. The prognosis is consequently highly favorable and the mortality very low. Severe symptoms, such as hemorrhage, perforation, etc., sometimes, though rarely, occur, as in simple typhoid fever. As to the value of quinine, much diversity of opinion is found. All agree that it does not influence the course of the typhoid element, and many state that its influence in controlling the malarial manifestations is slight or entirely wanting. Others state that it is of distinct value in combating the malarial element.

The above clinical description of "typho-malarial" fever appears to be that given by a majority of its historians in America, though every conceivable addition to or subtraction from this symptomatology is found in the literature.

It must be noted, however, that the French descriptions of the disease differ in important respects from the American. Most of the French writers state that the course of the disease is usually severe and the mortality high;[13 18 19 20 24 33 43] that complications are common;[20 24 33] that rose-spots usually appear,[18,19,20,24,33,43] and that quinine has a modifying influence on the disease.[18,19,20,33,43] The French writers also hold various views as to the resulting clinical picture, some stating that the two diseases are simply superimposed the one upon the other, each preserving its individuality,[19,43] and others finding that the clinical picture varies markedly in individual cases,[44] in some showing a predominance of the typhoid, in others a predominance of the malarial manifestations, and in others a combination of both of these elements, and in some of these last cases an apparent clinical fusion of the two elements.[20,24,33] The view is also held by some that the malarial manifestations remain latent during the course of the typhoid.[43] As a rule, the Italian observers[23,30,36] state that the two diseases are coincident and superimposed, each preserving its individuality.

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* Several American writers of note state that the course of the disease is not less severe than that of simple typhoid fever, but the vast majority of American physicians, especially in the South, who describe "typho-malarial" fever, hold the view that the disease is much milder and less dangerous than typhoid fever. The following example is fairly illustrative: At a summer hotel an epidemic of typhoid fever occurred due to contaminated well water, and a large number of people were simultaneously taken with the disease. In one family three cases occurred, of which one, with a severe attack, was diagnosticated as typhoid fever, and the other two, with mild attacks, as "typho-malarial" fever.

It is thus seen that the usual American descriptions of "typho-malarial fever" differ essentially from the French, and we shall now consider which view, if either, is sustained by the evidence of our thirty cases of true combined typhoid and malarial infection.

A glance at these cases shows that, as a rule, the course of the disease was of at least average severity as compared with typhoid fever and generally of greatly increased severity. Only one or two cases exhibited a mild course. The mortality was high. Ten of the thirty cases ended fatally, a mortality of 33.3 per cent. This high rate of mortality is nearly double that of typhoid fever, if we take a large body of typhoid statistics covering a long period of years and collected from different climates and regions of the world. Complications, often severe, are seen to have occurred in a large number of the cases. Rose-spots are specifically mentioned in twenty of the cases, and in several of the other cases they may have occurred, although the notes are silent on this point. Quinine was given on the appearance of malarial manifestations in nearly all, if not, in fact, in all of the cases, and is seen to have had an unfailing influence, either controlling the malarial element for a period or removing it entirely from the scene. Quinine thus shows itself to be a true remedial agent, and appears to be as efficacious in controlling the malarial element in the combined infection as it is in uncomplicated cases of malarial fever. It is also of diagnostic value,[41,43] second only in importance to the microscopical examination of the blood.

As to the clinical picture presented in our cases, no uniformity is found. The typhoid picture, however, was always present, and in nearly all of the cases dominated the scene. The malarial manifestations appeared at different points in the different cases. Repeated paroxysms of chill, fever, and sweating at the onset of the disease appeared in many of the cases, in this respect resembling the picture generally described in "typho-malarial" fever. In other cases these features were absent. In some of the cases febrile paroxysms occurred during the height of the disease and irregularly through its course, though this was the exception. In other cases the malarial paroxysms occurred only in the convalescence from the typhoid. It is interesting to note also that in several cases malarial paroxysms directly preceded or accompanied the onset of the typhoid, disappeared completely from view during its course and again reappeared during convalescence. This would seem to indicate, as Baccelli,[30] Laveran,[43] and others[36] have suggested, that the typhoid fever is the more masterful disease, and to illustrate the truth of the old adage, "de duobus morbis corpus unum obsidentibus potior alterum obscurat;" but the important fact must not be forgotten in this connection that quinine was freely used against the malarial element whenever it appeared, and in all probability completely changed the clinical picture that would otherwise have been seen, and I am firmly convinced that had the malarial involvement been left untreated to pursue its own course the composite clinical picture would have been very different from what it actually was after quinine had removed the malarial participation in the course of the disease. There appears to be every reason for believing that without the interference of quinine the malarial paroxysms of chill, fever, and sweating would have continued to complicate the picture of the typhoid and would have caused an appearance of a thorough mixture and fusion of the malarial and typhoidal elements of the disease, as has been claimed by many American writers. The malarial element in our cases seems to have been suppressed from view by the quinine, but in many cases reappeared at one point or another whenever, in the struggle for existence, its power became strong enough to assert itself visibly.

Before dismissing the subject of paroxysms of chill, fever, and sweating, described as occurring so commonly at the onset of "typho-malarial" fever, it is well to remember that similar paroxysms are sometimes seen at the onset of simple typhoid, and even at times during its course, as Osler[32] has well shown. Profuse and repeated sweating is sometimes, though rarely, seen in typhoid fever of so pronounced a character as to have given rise to the term "sudoral typhoid" of Italian and French writers. Jaundice is another rare complication of typhoid fever, being seen in only 1.1 per cent. of the Munich[22] autopsies.

A few other clinical features of our cases remain to be pointed out. Abdominal symptoms in most of the cases were marked, not slight, as the American writers describe in "typho-malarial" fever. Bilious symptoms in these cases were not more prominent than would be expected in such a series.

If we add to our thirty cases of true combined typhoid and malarial infection many other cases described in the literature[18 19 20 24] that do not meet the criteria we have established for admitting them to our enumeration, but, nevertheless, resting upon sufficiently detailed clinical observations to establish as very probable their authenticity, we shall find in them strong confirmation of almost all of the facts observed in our thirty cases, although, of course, individual differences occasionally occur. Most of these cases are recorded in the French literature, though some few described by American writers are also found.

What, then, is the result of our study bearing on the question of the prevalence of a "typho-malarial" fever? It is seen that our cases of true combined typhoid and malarial infection offer little or no support for the "typho-malarial" fever as described clinically by American physicians, but, on the contrary, support strongly the observations of the French writers who have described a "typho-malarial" fever. It is seen that the "typho-malarial" fever of the French observers is a true combined typhoid and malarial infection; but the "typho-malarial" fever described as so prevalent in the United States, and especially in the Southern States, is not, as a rule, certainly a true combination of typhoid and malarial disease. The important point of difference clinically between the "typho-malarial" fever of American and French writers is found in the *severity and mortality* of the disease. The statistics of the United States army[14] during the war show the mortality from "typho-malarial" fever to have been less than one-third of the mortality due to simple typhoid fever. Such figures, of course, show that the "typho-malarial" fever reported during the war was not true combined typhoid and malarial fever, but doubtless it was either very mild simple typhoid (generally) or continued malarial fever.

Unfortunately, very few observers of the "typho-malarial" fever of our Southern States have studied their cases with modern methods of scientific investigation. However a few scientific observations on the subject have been recorded.[27 28 29 37 40 41] Dock,[27] of Galveston, Texas, stated, in 1894, that in his wide experience he had never encountered a case of combined typhoid and malarial fever, nor had he ever seen the Southern type of "typho-malarial" fever. He had "offered to go anywhere where a doctor had a case of continued malarial fever or typho-malarial fever," in order to discover the malarial parasite in the blood of a typhoid case, but he had never found such a coincidence. He conducted six autopsies on cases diagnosticated by experienced men as "typho-malarial," and in all cases found simple typhoid fever. At the Johns Hopkins Hospital in Baltimore, where hundreds of cases of typhoid fever and of malarial fever are seen, many coming from the neighboring Chesapeake Bay region and from the Southern States, the "typho-malarial" fever of Southern writers is unknown, and only two cases of true combined typhoid and malarial infection have been seen. The reports from foreign countries in general are the same. The Italian observers,[23 30] so fortunately placed to study this subject, are not acquainted with the American type of "typho-malarial" fever. Rho[36] states that not a single such case has been reported from Italy. It therefore seems clear that the disease described as so prevalent in our Southern States is not a true combination of typhoid and malarial fever. It seems probable that future investigations will show it to be most often a mild form of simple typhoid fever,[27,31,37] and in some cases irregular continued malarial fever.

That continued malarial fever often shows a picture so close to that of typhoid fever that a diagnosis is very difficult is well known, and such cases are not infrequently seen in the Johns Hopkins Hospital, and have been described by all writers on malarial fever.[30,39,41,42,43] Exact observations must be made in the Southern States, and the microscopical and clinical laboratory methods of study must be employed more generally before the exact truth about the "typho-malarial" fever can be known.

It is especially to be desired that systematic observations on this subject may be made by our army surgeons situated at various places in the Southern States.

In regard to the relative frequency of occurrence of true combined typhoid and malarial infection, what are we to infer from our study? Do we agree with the conclusions of Rho,[36] writing in Italy, who says: "The term typho-malarial fever has caused much uncertainty in medicine and much error of diagnosis; so far as relates to the contemporaneous infection of malaria and typhoid, the matter reduces itself to a rare coincidence, to a simple complication, which does not merit a special name."

I think that our statistics show evidence that, on the whole, this conclusion is rather too sweeping, but would apply with a considerable degree of accuracy to temperate climates where malarial fever is not common. In southern and tropical countries, where malarial fever is endemic and typhoid fever prevalent, it seems entirely probable that cases of combined infection are fairly common. This view is supported by Vincent's seventeen cases from Madagascar and Algeria, Laveran's two cases from Algeria, Kinyoun's five cases, coming from our Southern States, and by many other observations made in southern countries, and especially by French physicians in the countries lying in the Mediterranean basin. The mere mathematical theory of chance would also support this view.

It is probable that cases of true combined malarial and typhoid infection are not uncommon in our Southern States, but such cases are certainly not the cases that have been described from the South under the name "typho-malarial" fever. It is to be sincerely regretted that this misnomer has become so general, involving as it does an error of diagnosis and sometimes useless and even vicious therapeutic measures.

There is no excuse for preserving the term, and we may hope that the near future will find it thoroughly eliminated from use.

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THE OCULAR EVIDENCES OF HYSTERIA.

WITH ILLUSTRATIVE CASES.

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NOTWITHSTANDING the importance attached by writers to the eye-symptoms in the diagnosis of hysteria, and although Charcot himself years ago pointed out their extreme value in establishing the identity of this neurosis, they have not received the attention they deserve. Of all the sense-organs, not excepting the skin, the visual apparatus furnishes the most constant, the most easily detected, and the most conclusive signs of the hysterical presence. This is my apology for importing into this essay a description of the simpler methods employed in making an examination of the eye for evidences of the disease. Although well known to every ophthalmologist, they are often unfamiliar to the general student, and will consequently bear description.

My purpose is to dwell only upon the ocular signs of hysteria that are most commonly found in cases of *petite* and *grande hystérie,* as well as to furnish a description of the means by which they may be accurately determined, even by those who make no pretence to a knowledge of ophthalmology, who are not expert in the use of the ophthalmoscope, and who are not familiar with even the rudiments of physiological optics.

In the cases presented the diagnosis of hysteria was made from the eye-symptoms and ocular signs; in most instances confirmatory evidence was subsequently obtained by a more general examination of the patient.

Probably the most important hysterical eye-signs are anomalies of accommodation—affections of the ciliary muscle.[1] Parinaud insists that even in the absence of other hysterical stigmata, the neurosis can be confidently diagnosticated when ciliary spasm (of the kind to be described) is present. In hysterical spasm the eye acts as if it were under the influence of pilocarpine or eserine. The accommodative range is limited at both ends, and the patient reads or does other near work with difficulty; for these reasons, the condition has been called hysterical insufficiency of accommodation, ciliary hyperæsthesia, ciliary paresis or paralysis, and painful accommodation. Every degree of spasm may be present, just as one sees all degrees of hysterical muscle-contracture elsewhere in the body. The *punctum proximum* and *punctum remotum* may approach or even coincide, and the patient reads fine print nearer the eye than usual or at a fixed point. This, when it occurs, may be regarded as conclusive evidence of hysteria. As a rule, however, there is a marked, but incomplete, spasm of accommodation—the near point for distinct vision being always nearer the eye than normal.

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[1] The reader is reminded that the nearest point at which the eye can distinctly see the outlines of small objects held directly in front of it is called the punctum proximum (or P), the greatest distance being the punctum remotum (R). The distance between these is the range of accommodation, not to be confounded with the force exercised by the ciliary muscle in looking from P to R—the amplitude of accommodation. Without going further into this

Hysterical spasm of the ciliary muscle usually produces false myopia and hysterical near-sightedness for distance, which, just like the axial variety, is improved by concave glasses. If there be a doubt as to the character of this short-sightedness, a single drop of a solution of atropia (1 per cent. in patients under thirty-five years of age, ½ per cent. for those between thirty-five and forty-five) instilled into each eye, after meals, for two days, will disclose the true refraction.

CASE I. *Hysterical contracture of accommodation, with recurrent amblyopia and defective visual fields*.—B. E., aged ten years, well nourished, but a nervous, an ambitious and much-worked school girl, came to me on account of very defective vision. Three years previously she had had scarlet fever and, two years before, diphtheria. The latter was a mild attack, but the scarlet fever kept her in the house for over a month, and she was very ill. She had no renal or cardiac complication. In addition to the defective vision she complained of confusion of print for six months before I saw her. For that period, also, she experienced difficulty in distinguishing characters on the blackboard. She has constant frontal headaches and photophobia. She holds her book close to her face in reading, and contracts her brows in her efforts to see. V., R. and L. = $\frac{1}{5}$ —; Jaeger II. is read with difficulty at 12 cm. in each eye. At 15 cm. she can distinguish words of Jaeger IV. Under atropine for a week her vision improved to 20/XL —, and in two weeks she was able to read Jaeger II. fluently at 15 cm. and her symptoms greatly improved. Treatment: abstinence from all near work, outdoor life, strychnine, galvanism, and atropinization. Under this treatment her eyes, as well as her general health, grew gradually better, although she had many relapses. Six months later her vision

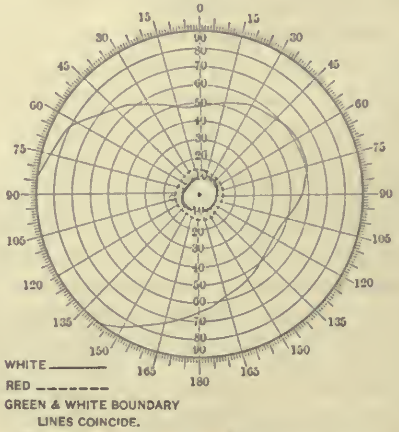
matter, a fair test of the accommodative range may be made (by the aid of correcting glasses if these are needed) by observing (1) how near the eye and (2) how far away the patient can read the finest (diamond) print. In fairly normal eyes (or eyes fitted with appropriate distant-glasses) the near point (P) tested in this way should be 7 cm. at ten years of age, 8 cm. at fifteen, 10 cm. at twenty, 11.7 cm. at twenty-five, 14 cm. at thirty, 18 cm. at thirty-five, 22 cm. at forty, 28.6 cm. at forty-five, and 40.5 cm. at fifty.

was 6/vi in either eye, and she could read Jaeger II. at 30 cm. and had a range of 20 cm. One month previously her vision in either eye was 6/vi, Jaeger II. at 18 cm., and a range of 5 cm. It is now nearly three years since I first began to treat her, and she has had a couple of relapses, always attended by lowering of central vision and marked ciliary contracture. Her fundi, examined frequently, have always been normal. Concave lenses assist the central visual acuity somewhat, but convex glasses have not enabled her to read any better. This patient has shown evidences of hysteria other than the ocular signs. She has had facial hemispasm and anæsthetic areas. The perimeter has shown a great variation in the size of her visual fields. The area for white always approached the normal size as the asthenopic symptoms disappeared, and, although at one time it was contracted to within 15° of the fixation point, it is now practically normal. The color-field did not vary as much as that for white, but there was always a certain correspondence between them. She was never entirely color-blind.

During one relapse, brought on by an injudicious effort to study, her field in the left eye contracted, as shown in Fig. 1. She then had a range of accommodation of 5 cm. (17–12 cm.), and the asthenopia was very marked. The pupillary reactions (light, accommodation, electrical and palpebral) were all very sluggish. There was a doubtful anæsthesia of the left cornea at this time. It is noticeable that the field for red is larger than that for white. In this case the reversal or unusual order of the white and color-fields was very marked, as shown in numerous perimeter charts.

FIG. 1.

LEFT.



Hysterical contraction of the visual field.

Hysterical amblyopia may be so marked that the patient has to be led about the room, or, more usually, it may pass unnoticed by the patient. It is not improper to regard the visual defect as due to an anæsthesia of the perceptive elements of the retina in correspondence with that loss or perversion of sensation exhibited by the skin and mucous membrane in other phases of hysteria. This visual defect is almost always present, and when the central acuity of sight, first determined by test-types, is nearly or quite equal, it will be found on careful inquiry that peripheral vision is uniformly affected. The normal limits of the field of vision are measured by a good, stationary perimeter, obtainable from any optician.[1]

Case II. *Hysterical amblyopia and amaurosis and paralysis of accommodation in a boy; recovery; hysterical contraction of the fields of vision.* —J. Y., aged nine years, has a healthy parentage. He has been a "mouth-breather," owing to post-nasal adenoid vegetations and enlarged tonsils, ever since the mother can remember. He was sent to a kindergarten when six years of age, when it was noticed that his vision and color-sense were good. At seven he had scarlet fever.

He has been going to the public school for a year and a half, and during the past six months his teacher noticed that he did not see the figures on the blackboard very well and that he held his book close to his face while reading. Quite recently his vision has been very much worse—so much so that he runs against articles of furniture, and has been obliged to leave school. The patient is a bright, well-nourished, intelligent, and precocious boy, who tells a pretty consistent story of his troubles. He has suffered much from nocturnal enuresis during the past year and shows his nervous temperament by never remaining quiet for a minute at a time. Even when his vision became very defective he was constantly moving, wandering about continually from one part of the house to another.

November 17, 1895, the condition of his eyes was as follows: both pupils widely dilated, neither of them contracting more than ¼ their diameter on looking at a near point. They also responded very sluggishly, even to bright light. He perceived hand movements only in each eye, but at 10 cm., after some coaxing, could distinguish words of Jaeger XIV. This attempt, he claimed, brought on frontal headache, which he now has every day. He had marked photophobia. There were absolutely no fundus changes, and the retinal field was uncontracted to a very faint light. He was immediately treated with galvanism, interrupted current, half *ma.*, for five minutes at a time three times a week, and given a tonic containing strychnine. Atropine was prescribed, and, by the aid of skiascopy and the ophthalmoscope, his total refraction was found to be + 1 D. in each eye. After three weeks his adenoids and tonsils were removed.

January 17, 1896. Patient is decidedly better in all respects. V., L. = words of Jaeger I. and 20/xx, but the fine print can be read best at 20 cm., becoming more indistinct when the test-words are brought nearer or removed further from the eye. He was allowed to go to school for a few hours daily.

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[1] The examination of hysteropes requires particular care, lest the patient's eye become fatigued and the defect be exaggerated or improperly measured. The perceptive elements of the retina in an hysterical subject are not very sensitive to form and white objects, and his ciliary muscle is usually weak. There should be frequent interruptions, therefore, of the work of perimetric measurement, and only one eye examined at a sitting. It should be remembered, also, that the hysterope is often greatly influenced by suggestion, and it is always wise to make "control" experiments when a subjective test is being used.

28*th.* Had to leave school owing to return of confusion of print, photophobia, and frontal pains. V., L. = $\frac{4}{6}$ and words of Jaeger X.; V., R = $\frac{4}{6}$ and words of Jaeger VI. The Jaeger types are read best at 12 and 15 cm., respectively; there is practically no accommodative range.

The patient was now put under atropine for two weeks, but, although there were fewer headaches, he experienced no other improvement. On recovery from the cycloplegia, V. = $\frac{1}{10}$ and words of Jaeger XVI. in either eye. No improvement with glasses for distance or near.

March 17*th.* Patient almost as bad as ever; V. = $\frac{1}{15}$ *u. o.* and no Jaeger. He was given galvanism regularly, and in the following June his visual acuity was $\frac{2}{3}$ in each eye, and he was able to read Jaeger II., with difficulty, at from 15 to 18 cm.

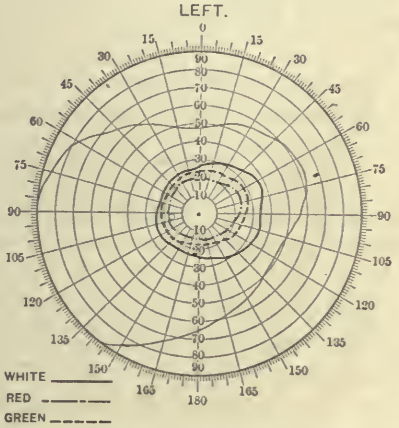
With slight relapses, this improvement held until the following October, when he was brought to me with V., R. = $\frac{9}{100}$ and words of Jaeger XII. at 15 cm.; V., L. = $\frac{1}{10}$ and Jaeger XII. at 16 to 18 cm. He now complained of photophobia, pain in eyes and forehead, and showed, for the first time, evidences of blepharospasm. He had a return of nearly all the signs of ciliary contracture that were present when I first saw him. I again thoroughly atropinized both eyes, and in six days had the satisfaction of discovering that he could read Jaeger I. at 25 cm. with + 4 D., and with + 1 D. got nearly normal vision in the distance. The atropine was continued for ten days and the boy sent to a manual training school, where it was arranged that he should use his eyes as little as possible for near-work. He has since had very few relapses. When twitching of the lids, photophobia, dimness of vision, or any of his old symptoms recur, he is kept from school and atropine employed. This appears not only to relieve the ciliary spasm, but has an excellent moral effect upon the patient, who is very fond of his work. When last seen he had some difficulty in seeing the blackboard, and I found his vision to be as follows: V., R. = $\frac{1}{2}$ and Jaeger I. at 12 to 15 cm.; V., L. = $\frac{2}{3}$ and Jaeger I. at 10 to 13 cm.

I never was able to demonstrate diplopia or polyopia in this case, although the patient presented many other local and general stigmata of hysteria.

The fields of vision in this case were very interesting. As soon as the patient could see a test-object 10 mm. square he was examined carefully with the perimeter many times. His field for white has never widened beyond 40°, even when his central acuity was normal. The narrowing of the field has always been regular. (See Figs. 2 and 3.) There have not been any sector-like defects or scotomata, relative or positive. In the early stages of the examination, and upon two other occasions, the boundary of the field for white coincided with the tenth parallel, and the color areas were almost abolished, but the average measurements have been about as follows: white, 30° all round; red, from 20° to 25°; green, from 25° to 30°. These measurements have varied greatly, owing to the ease with which the eyes were fatigued. Indeed, the fields for green and red have, on several occasions, measured about the same as that for white. There has never been the slightest fundus alteration.

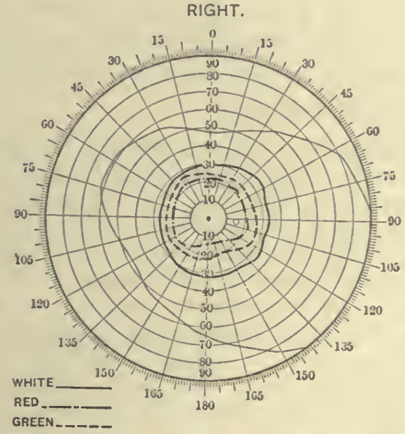
Contraction of the Fields of Vision. The predominant peculiarity of an hysterical contraction of the visual field is that while, in every other disease where peripheral limitations occur, the color-field is affected *pari passu*, or in greater proportion than the field of white, in hysterical amblyopia the field is less affected for colors than is the field for white, just the reverse of that which obtains in other nervous affections. Even where the field for white is still the largest it can usually be shown (where there is no perimetric defect) that the visual field for

FIG. 2.



Field of vision in Case II., hysterical amblyopia. V = ²/₃.

FIG. 3.



Field of vision in Case II. V = ½.

red is larger than that for blue, and these measurements should always be taken in doubtful cases. Excellent examples of this strange phenomenon are exhibited by most of the cases here reported. This reversal of the order and extent of the fields for white and colors is, when present, positive evidence of the existence of hysteria; it cannot be simulated, and is caused by no other ocular disorder. It is readily determined, and possesses a diagnostic value equal to the anæsthesia of the glottis and pharynx so frequently referred to as pathognomonic of this neurosis.

Blepharospasm. Although contracture and spasm of almost every member of the oculo-muscular system has been observed in hysteria, many of these are differentiated from true paresis and insufficiencies with some difficulty. A few are, however, so evidently functional disorders, and their detection is so comparatively easy, that I do not hesitate to refer to them as hysterical stigmata with which every one should be acquainted.

Even before the days of modern ophthalmology it was noticed that spasm of the orbicular muscles was frequently associated with amaurosis and amblyopia, even when there was no apparent structural disease of the ocular apparatus. Such a state of affairs should make us suspect and further examine the patient for hysteria. All such forms of spasm of the orbicularis—tonic, clonic, transitory or permanent, unilateral or bilateral —are probably hysteric. If central or peripheral excitants competent to produce the spasm can be excluded, and if other hysterical stigmata be present, the probability becomes a certainty. The orbicular contraction may be a part of a facial or more extended hemispasm, or it may be limited to a single muscle.

CASE III. *Intermittent and chronic spasm of the right orbicularis and other facial muscles in an hysterical subject.*—Mrs. J. E. is the daughter of a distinctly neurotic mother, but did not herself exhibit signs of hysteria until a year ago, after a double ovariotomy. Following recovery from the operation she became easily excited, nervous, and had fits of crying. She also complained of transitory numbness of her arm and corresponding leg, accompanied by a feeling of general exhaustion. Complains much of headache affecting the vertex and occipital regions. Her range of accommodation is reduced one-third, and she complains of photophobia and asthenopia. Two weeks ago the lids of the right eye began to twitch, and this symptom has increased in severity since then. Some days it entirely disappears, to return on the slightest excitement or on attempting to read or sew. Her central vision is unaffected.

I kept this patient under observation for several months, and was unable to relieve the spasm, which finally extended to the whole group of facial muscles on the right side, including the masseter and sternomastoid. On several occasions there was some slight twitching of the facial muscles on the left side, but this did not persist. When I last saw her the purely ocular distress had considerably diminished, but the muscular spasm was as marked as ever, in spite of general and local treatment.

Blepharospasm and photophobia are frequently associated in hysterical subjects, and both signs may be very marked. The following case is an example:

CASE IV.—At the instance of Dr. John A. McDonnell, I examined Mrs. B., aged thirty-one years, who had been in ill health and a pronounced neurasthenic for many years. Three months before my visit she began to complain of inability to use her eyes for more than a few minutes at a time. Later, she complained of photophobia and twitching of the lids. These symptoms increased in intensity until even the least exposure to light brought on "spasm of the lids."

When I saw her she was confined to bed in a room from which every ray of light had been excluded. Window curtains were drawn, shutters closed, and blankets had been pinned over the casements. Her eyes were completely covered with bandages, and over these she held her hands. After some persuasion she allowed a candle to be brought into the room, and by its aid I was able to make out, after removing the bandage, a well-marked bilateral tonic blepharospasm, unaccompanied by redness or tenderness of the globe. Further examination of the eye was impossible, but the patient presented other stigmata of hysteria.

Although the persistent blinking of the eyes that constitutes the usual form of clonic blepharospasm is not necessarily hysterical, it often forms one detail of the neurotic picture. Apart from organic disease of the lids or other parts of the eye, it may properly be regarded as a symptom of hysteria, and will usually prove to be such.

Monocular Diplopia or *Polyopia.* This is a curious hysterical phenomenon—probably the result of ciliary spasm—that may be developed in many hysteropes. I say developed, because the patient is usually unconscious of the double vision as such. It commonly presents itself to him as part of his visual defect. Tests should be made in both a lighted and a darkened room. One eye being covered, a white match is held vertically three or four inches in front of the uncovered eye. The patient is then asked to observe whether the object appears double, as it is slowly moved from its first position to a point three feet away. In most cases the match will present a double image when held quite near the face; the images approach one another and become quite or almost fused as they are removed, to separate again more and more until the metre distance is reached. The match is again from this point gradually brought close to the eye, when the same phenomena, but in reverse order, will be manifested. The second eye is similarly examined, and finally the room is darkened and a further (control) test is made with a candle flame. Sometimes three or more images (polyopia) are observed, and it is usually possible to exclude one or more of these by carefully interposing a card so as to cover various segments of the pupillary area during the examination.

Case V. *Hysterical, monocular, homonymous diplopia in a neurasthenic woman.*—Mrs. P., aged forty years, has had weak eyes as long as she can remember, and for ten years past has observed double vision when fixing either distant or near objects. This diplopia is lately quite marked when she attempts to read. Her general health is far from good, and she complains of "nervousness." There is no history of injury to the head, of constitutional disease, or of any organic brain lesion. She has never been very strong, and gives a history of several attacks of "nervous prostration." Steady use of the eyes brings on frontal headache and pains in the globes themselves. No glasses have relieved these symptoms, nor have they sensibly diminished the blurring and confusion of print observed whenever she attempts to read. In looking at a distant object the indistinct or second image appears to the right of the clearer one when looking with the right eye and to the left when fixing with the left eye. When her general health is at its best she can sometimes obtain a single, but blurred, image of a near object for a short time by making special efforts to fix.

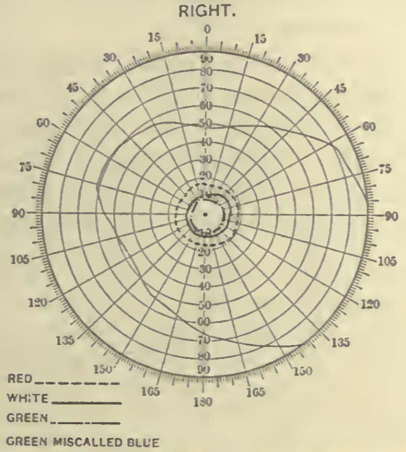
The ordinary tests readily develop the monocular diplopia. In reading the distant test-types each letter is double, the diplopia being more marked with the right eye than with the left. V. = $\frac{2}{3}$ — in either eye. She has a regular hyperopic astigmatism of 1.0 D., and with this corrected the visual acuity is almost 1. On slowly approaching the nasal side of the right (the left excluded) pupil with a card, the second left image is gradually cut off and the patient sees singly. Reversing the experiment, the right image disappears. In the same way both the distinct and indistinct image in the left eye can be eliminated.

I saw this patient a year after my first examination and found the ocular conditions unchanged. She read Jaeger I. (blurred) with either eye. Her fields (roughly taken, owing to unwillingness of patient) for white and red were both contracted, the former much more, proportionately, than the latter. Her health had somewhat improved, but the diplopia had persisted, even under atropine and convex glasses, for both distance and near. The fundi were perfectly normal, and there was no defect of the extrinsic muscles, although the accommodative range was diminished nearly one-fourth.

Case VI. *Contracture of the ciliary muscle, with monocular polyopia and amblyopia in a young hysterope; temporary cure by suggestion.*—D. N., aged thirteen years, is a nervous, imaginative child and intellectually far advanced beyond her years. Her father is also very "nervous" and has smoked to excess since boyhood. One sister is very delicate, and acts, the mother reports, as if she were going to have St. Vitus' dance. Ever since the child can remember she has had asthenopic symptoms. These were associated with indistinct distant vision and the necessity for holding her book close to her face—a condition unrelieved by any glass which she has ever had. If she reads for more than fifteen minutes the print blurs, her eyes ache, and she has severe supra-orbital pains. Her forehead has wrinkles which show distinctly when she fixes either a near or distant object. She has had double vision for years past. The pupillary reaction is fairly prompt to light, but is slow, imperfect, and irregular when the patient converges. Her central acuity of vision varies from day to day. On the first occasion it was about $\frac{2}{5}$ in each eye, but it has fallen as low as $\frac{1}{5}$. She is always able to read at least words of Jaeger IV., but the amplitude of accommodation is extremely limited. She has no changes in the background whatever, and the media are quite clear. Her refractive error, under atropine, is insignificant, and there is no heterotropia worth speaking about. The double vision, upon a closer examination, resolved itself into monocular polyopia. This curious symptom could not be associated with any other cause than that of hysteria. I have made a number of experiments on the child with particular reference to this phenomenon, and am satisfied of its purely hysterical character.

The patient has contractures of the flexors of the forearm and fingers of the left hand. These are clonic in character, and have persisted for three years. She is very subject to vertigo and to headaches brought on by any attempt to use the eyes. In the course of a pretended examination of her eyes for glasses, vision can often be improved (by using a plane glass, a + or — 0.12 D. lens, or a $\frac{1}{2}$° prism) from $\frac{2}{7}$ to $\frac{2}{3}$ or therabouts. The same is true of the shifting boundaries of her field of vision; it is extremely difficult to map out the areas for red, green, and white, although the latter usually occupies a larger space than the colors. A curious circumstance is that she refers the tones of five different tuning-forks to certain colors (that flash constantly before her closed eyes) while they are vibrating upon her vertex. C produces a brownish color, C^1 black, C^2 yellow, C^3 red, and C^4 yellow or yellow-white, and she is quite consistent in her replies to questions concerning them.

FIG. 4.



Reversal of the color-field in a case of hysterical amblyopia. V = $^2/_7$.

The patient has, thus far, not permanently improved, although there are days at a time when she seems very much better. Owing to the fact that her eyes are so readily fatigued, it is not easy to determine the limit of her contracted field for white, red, and green. Fig. 4 represents the second attempt of the series, there being very little difference between the two eyes. Red is largest, then comes white, and finally green, which is recognized as blue.

A temporary improvement was obtained in this child by ordering for her "suggestive" glasses. These were weak concave ($\frac{1}{8}$ D.) lenses that could not possibly exert any refractive influence upon sight, but were given her with the positive assurance that they would cure her. For a time the result was magical; she read Jaeger I. with ease and distant vision became nearly normal in either eye. The asthenopic symptoms lessened and the visual fields widened. When the glasses were removed from her eyes she became as blind as ever; when they were replaced the improvement was almost instantaneous. A relapse occurred after a few months and has persisted to the time of writing.

There are numerous other indications afforded by the ocular apparatus of the presence of hysteria.

As a rule, whether the pupils are unusually contracted or dilated, the ordinary reflexes are preserved—that is, they contract when light is thrown upon them, and when the patient is directed to fix a near object—they expand when light is withdrawn, or when he is told to gaze into the far distance.

Hysterical photophobia, not necessarily associated with spasm of the lid muscles, is a common experience in hysteria, and, when present at all, may be so marked as to give rise to a suspicion of organic disease. The absence of all signs of vascular congestion is usually sufficient to exclude the latter. The patient often asserts that the light hurts the eyes even when these organs are covered with a heavy bandage—an exaggeration that should excite the suspicions of any one conversant with the hysterical character.

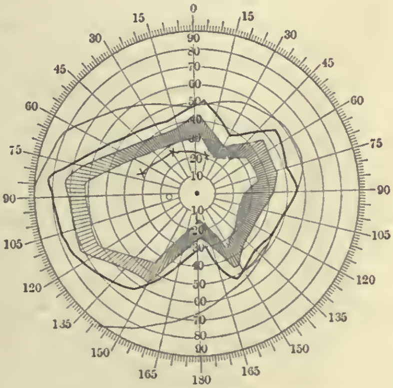
Ring Scotoma. Most observers regard defects in the field of an annular character as presumptive evidence of the presence of hysteria, and, although I should hesitate to rely upon this sign alone in the diagnosis of the neurosis, I have never seen a well-marked instance of its presence where other indications of hysteria were wanting. The following case is so typical that I give it, with the perimeter charts.

CASE VII. *Hysterical asthenopia, with "ring" scotoma and paresis of accommodation, in a young hysterope.*—W. H., aged seventeen years, is a member of a decidedly neurotic family, and has complained of a number of nervous symptoms most of his lifetime. His family physician informs me that he has had and still presents several hysterical stigmata. His school-life has been frequently interrupted by ocular headaches and inability to use his eyes, owing to fatigue and blurring of print. During the past year he has grown and developed abnormally, and looks as if he were twenty years of age. He complains of lassitude and constant fatigue on any exertion. His central vision is good, except that he has 1 D. of hyperopia, and his eye-muscles are normally balanced. He exhibits a marked paresis of accommodation. In either eye, without glasses, the accommodative range is 18″—28″; with a 2 D. + glass it is 9″—25″, with some transient blurring. A careful exploration of his visual fields discovered a curious condition of affairs—the so-called "ring scotoma"—the area of blindness not affecting the extreme periphery of the field nor the central region, but covering an area, roughly speaking, about 10° wide on either side of a parallel of latitude (Figs. 5, 6, 7, and 8.)

These varied in size and situation from time to time as the patient grew better. Complete rest, tonics, massage, and faradization were resorted to, and finally the patient was sent on a three-months' camping excursion to the Rocky Mountains, where he practically recovered.

FIG. 5.

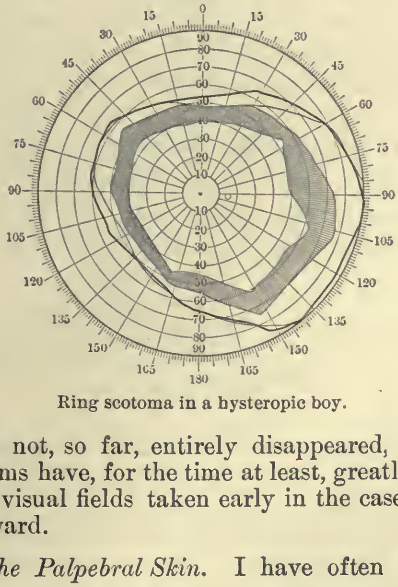
LEFT.



Ring scotoma in a hysteropic boy.

FIG. 6.

RIGHT.



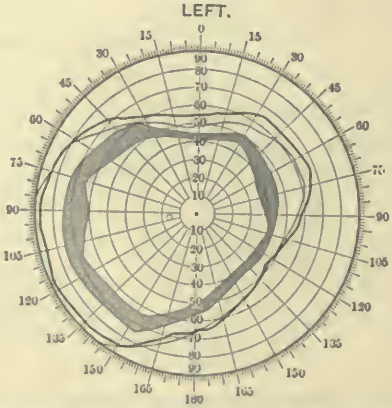
Ring scotoma in a hysteropic boy.

The scotoma has not, so far, entirely disappeared, but all the other hysterical symptoms have, for the time at least, greatly improved. Figs. 5 and 6 show the visual fields taken early in the case, and Figs. 7 and 8, a month afterward.

Anæsthesia of the Palpebral Skin. I have often examined cases of hysterical amblyopia for anæsthesia of the palpebral skin and ocular conjunctiva—noted by Gilles de la Tourette—and have usually found it when hemianæsthesia is also present or where the pharyngeal reflex is wanting or dulled. In other words, the orbicular area shows a want of sensibilty in common with other regions that are most often affected in hysteria.

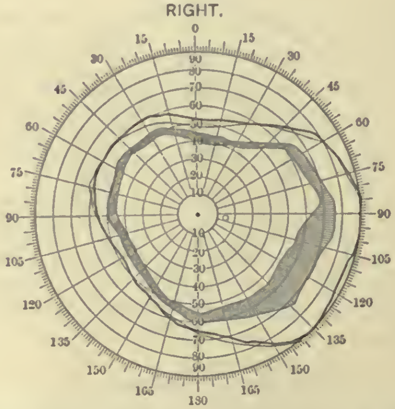
Pseudo-paralytic Ptosis. This is another purely hysterical stigma. This rather unusual symptom, unlike organic paralysis, is almost always accompanied by other signs of hysteria, especially reflex photophobia, blepharospasm. The eye closes quickly when the hysterical lid is raised; slowly in true paralysis. In unilateral hysterical ptosis, as Charcot observed, the eyebrow is lower on the healthy side; higher in true paralysis.

Fig. 7.



Ring scotoma in hysteropic boy—one month after first perimetric examination.

Fig. 8.



Field of vision (ring scotoma) in a hysteropic boy—one month after former measurement.

Traumatic Hysteria. Suspicion should be aroused by the appearance of any of the symptoms above detailed if they show themselves after an injury, however trifling, if it be accompanied by mental shock. My personal experience has been that a majority, or large minority, of examples of ocular hysteria belong to the so-called *traumatic neuroses.*

It must not be forgotten that just as hysteria simulates most organic lesions, it may also be present with them. Patrick has, among others, recently emphasized this important fact, and has reported cases illustrative of it. The eye is no exception to this rule, but fortunately organic alterations in the ocular structures, as examined by the ophthalmoscope, perimeter, etc., usually speak for themselves, and present characters entirely unlike those of a purely functional affection.

In conclusion: 1. Most cases of hysteria present well-marked, easily-detected eye-signs and symptoms.

2. A few ocular symptoms, such as reversal of the relation of the color-fields and the field for white, the tonic form of blepharospasm, spasm of accommodation and convergence, and pseudo-paralytic ptosis, may be regarded as pathognomonic of hysteria.

3. Defects of vision (in the absence of refractive errors, accommodative anomalies, and fundus lesions) are, generally speaking, hysterical if accompanied by photophobia and any form of blepharospasm.

4. No examination of a patient for hysteria should be regarded as complete without considering the condition of his ocular apparatus.

5. Where there is no conclusive external evidence of the neurosis present, the perimeter should be carefully used, the range of accommodation should be noted, and the ophthalmoscope employed.

6. It should always be remembered that ocular hysteria is common in children and men.

7. Organic disease (traumatism especially) of the eye may accompany purely functional disturbances of that organ.

For the benefit of those who wish further to pursue this interesting and important matter I append the titles of a few monographs on the subject.[1]

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[1] "Traité clinique et thérapeutique de l'hystérie," 1891. Par Gilles de la Tourette.

Charcot's "Lessons on Diseases of the Nervous System."

"De l'amblyopie liée à l'hémianesthésie et spécialement de l'amblyopie hystérique. Thèse de Paris," 1886.

"Ueber Sehstörungen bei functionellen Nervenleiden." Wilbrand und Sänger. Leipzig, 1892.

"Ueber neurotische Asthenopie und die sogennanten Anæsthesie retinæ." Wilbrand. Archiv für Augenheilk., xii., 1893.

Finally, a fair account of ocular hysteria may be read in the fourth volume of Norris and Oliver's "System of Diseases of the Eye," written by Parinaud and translated by myself.

EXPERIMENTAL STUDIES ON THE PREPARATION AND EFFECTS OF ANTITOXINS FOR TUBERCULOSIS.

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and

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(Concluded from p. 707, December, 1898.)

Part II.

Tests of the Antitoxic Power of Serums in Tuberculin Poisoning.

In these experiments we have considered:

1. Fatal doses of tuberculin* in sound animals.
2. Fatal doses in tuberculous animals.
3. Small doses in tuberculous animals to show the effect: (*a*) on the temperature; (*b*) on the local reaction.

Many difficulties present themselves in any attempt to demonstrate a specific antitoxin in tuberculosis by methods analogous to those used so satisfactorily in diphtheria. The principal of these relate to the difficulty of obtaining a highly poisonous product in small bulk unless tuberculous instead of sound animals are employed for the tests.

Objections can easily be made to the use of tuberculin and diseased animals for testing serums. In the first place, tuberculin when prepared by boiling heat may not represent the unaltered toxins of tuberculosis, though containing more toxic extractive substances from the bacilli than when made by evaporation of cultures at low temperatures. Yet we cannot safely say that tuberculin is a wholly altered product until we have further knowledge of its chemical nature. We know, indeed, that boiling heat not too prolonged does not destroy its most prominent physiologic action on tuberculous animals.

The propriety of using tuberculin in serum tests principally depends upon the view one may take of the character of the peculiar reaction. That question may need further elucidation, but it seems to us that the best explanation we have from observations up to date supposes tuberculin to be a *partly specific irritant, both to tuberculous foci and to the susceptible organism in general.* The local and general reaction is caused partly by the poison contained in the tuberculin, which irritates the sensitized cells composing the tubercle, and partly by those toxins set free by the hyperæmia or the enzyme (?) action directly or indirectly produced by the dose of tuberculin (see Bâbes and Proca[7]). Whether the toxins liberated are the same, chemically, as those obtained from artificial cultures of tubercle bacilli is not easy to determine; but that some are set free seems obvious from the profound general disturbance brought about by a minute dose of tuberculin. According to this theory, the poisons are stored up in the tubercles, and in part at least derived from the dead or weakened bacilli, as shown by Bâbes and Proca[7] in experiments with dead tubercle bacilli. Crookshank and Herroun[23] and Matthes[63 64] have extracted albuminous poisons out of caseous material from tuberculous lesions which had the properties of tuberculin. Kahler[43] and Lenoir[51] found albumoses in the urine of patients being treated with tuberculin, which produced tuberculin reactions and were present in the urine in excess of the amount injected as tuberculin. Thus we have some evidence of the discharge of accumulated pyrogenic substances; and that the tuberculin injected, in the minute dose necessary to cause the reaction, may not itself play the prominent part as a poison, but rather as the excitant to the discharge of other specific poisons.

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* Under the term "tuberculin" we here include the various extracts of tubercle bacilli, but usually mean the original Koch fluid.

Therefore, but for the uncontrollable amounts of hoarded toxin exploded, as it were, coupled with the local congestions, there would be no objection to proving the activity of serums in this way. Given the serum of a tuberculous animal which had been treated with tuberculin and had tolerated the reactions well, we might hope, if an anti-body had been in the serum, that it would be effective against the specific poisons developed in the animal body by tuberculosis, though not necessarily against tuberculin as obtained from cultures. By analogy, such an antitoxin ought also to manifest its activity on other tuberculous animals injected with a dose of tuberculin just large enough barely to produce a reaction (and at the same time with a dose of such serum sufficient surely to neutralize it). Should it be weak in activity, it would still seem possible to obtain some effect in that way. Furthermore, it might reasonably be expected that the fatal effects of doses of tuberculin just sufficient to cause death in tuberculous animals with uniform lesions might be inhibited by the administration of an efficient serum; or, at least, that the lives of the animals might be appreciably prolonged. Such tests ought to give qualitative results, though, from the unknown quantities of toxin to be dealt with, they manifestly would not serve as quantitative standards for serums.

On the other hand, healthy animals cannot be suitable for tests until we can obtain sufficiently toxic unaltered products of tubercle bacilli; while if the serums proved to be wholly or chiefly bactericidal, and not antitoxic, they would not reveal that fact in non-tuberculous animals.

As is well known from Koch's original experiments, healthy guinea-pigs tolerate very large doses of tuberculin. This fact renders it necessary to employ such a quantity of ordinary tuberculin to produce death that the effects of the unaltered ingredients of the culture fluid, such as glycerin, albumoses, or peptone, should be remembered, as well as the shock produced by the traumatism of large injections.

We occupied ourselves for some time in attempts to produce a concentrated tuberculin or toxin from cultures; but while it is comparatively easy to produce tuberculin, even from non-virulent cultures, which will usually be fatal in doses of 1 c.c. to 100 grammes of pig (the strength of toxin mentioned by Maragliano as used to test his serum), yet this ratio did not suffice in our experiments to kill pigs weighing above 250 grammes. In addition to the objections mentioned, we found its absorption from under the skin very uncertain.

We then sought by precipitation from cultures on proteid-free media to obtain a pure toxin which would be fatal in small doses. We also attempted to procure a concentrated poison from the bacilli by using weak alkaline extracts, but none of our preparations were quickly fatal to healthy animals in small doses, though producing cachexia and death after some time. After testing various preparations subcutaneously and intraperitoneally, without encouragement, we abandoned the idea of utilizing healthy animals for antitoxin or antituberculin tests. In the course of this work we used fifty guinea-pigs, weighing from 150 to 450 grammes. More recently, fresh extracts from crushed, living tubercle bacilli gave no more uniform fatalities.

Clinical experience with human tuberculosis confirms the fact that the poisons are of relatively low toxicity—where their immediate effects are considered—as compared with those of diphtheria, tetanus, etc. The same fact suggests itself as a reason for the indifferent results of experiments in sero-therapy with tuberculosis. The effect of tuberculin administered to an animal after the disease becomes established is, nevertheless, so powerful, and the dose so small, that the objections mentioned do not enter.

A surely fatal dose of tuberculin for a tuberculous guinea-pig, though not uniform, is small enough for testing serums; yet there are other factors which are not to be disregarded in such experiments, and which are very difficult to control. The local reaction varies considerably in intensity in the same series of animals. Differences in virulence of the inoculation material used, variations in lesions and in the extent of caseation, the age, and the frequent pregnant state of the animals, suffice to require large numbers of animals in any experimental work on tuberculosis. All these factors we found especially important in testing for anti-tuberculin.

For the reasons mentioned, the fatal dose of tuberculin necessarily varies. Differences in the stage of the disease, the injection of serums mixed with tuberculin, or given separately may produce diverse results owing to different rate of absorption* or other reasons. We also found that non-tuberculous serums, and even physiological salt solution when used under like conditions, gave results that dampen over-enthusiasm in making deductions. Yet in the experiments that follow, in the course of which two hundred and fifty pigs were used, there can be seen indications of a favorable influence or possibly an antitoxic effect from some of the serums on tuberculous guinea-pigs tested with fatal doses of tuberculin.

Details of the Methods Used to Test the Antitoxic Power of Serums.

Guinea-pigs were inoculated in lots of ten to twenty, at different times, with cultures or other tuberculous material of varying virulence. The point of inoculation was usually below the right groin in the subcutaneous tissue.

The amount of tuberculin used to kill them varied from 0.100 to 0.500 grammes, according to the stage and type of disease in the animals; it was made from non-virulent bouillon cultures. The same bottle was used in nearly all the tests. To test the effect on temperatures doses of 0.001 to 0.002 were employed.

The doses of serum ranged from 1 to 12 c.c. Some lots were tested with doses of serum and tuberculin proportioned to the weight of the pigs.

Loss of weight and strength were taken as the most practical criteria of the condition of the diseased animals at the time of testing.

The tests were made from twenty-one to fifty-six days after infection.

To avoid false deductions from lack of absorption of tuberculin when mixed with serum, it was given separately in most of the experiments.

Serums were injected at the same time or before the tuberculin, subcutaneously, or, in some instances, intraperitoneally; the tuberculin always under the skin. Temperatures were taken in the rectum at the time of injection and six hours later. Some of the surviving animals were usually killed for comparison after twenty-four hours.

Normal horse serum, diphtheria antitoxin, normal sheep serum, 0.6 per cent. NaCl solution, and hydrocele fluid were used to control anti-tuberculosis serums in comparative tests.

Serum of Ass R, First Bleeding.

March 23, 1896. 16 guinea-pigs of an average weight of 692 grammes were inoculated in the groin with a non-virulent sputum, which kills in from 60 to 100 days.

May 7th. We tested 12 *pigs on the forty-fifth day.* Each received serum subcutaneously in doses of from 1 to 8 c.c. mixed in 7 instances with

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* The slow absorption of the infiltration produced by injections under the skin of guinea-pigs of sheep, cow, ass, and rabbit serums was a point specially noted by us in all this work, and has been of late particularly contrasted with the better absorption of horse serum by Uhlenhuth.[90]

0.300 c.c. of tuberculin. (I.) Of the 7 pigs that received serum and tuberculin 5 survived, while 2 died in from 13 to 15 hours. (II.) The 2 pigs that were injected with serum only survived and showed no effect. (III.) 3 pigs, controls, received tuberculin only and died in from 9 to 10 hours. Three days later (II.) received 0.300 c.c. tuberculin and died in from 10 to 12 hours.

Result. The infiltrate was not well absorbed. The lesions were not very uniform, but the result seems favorable to the serum, except that there was an insufficient number of controls. No protection was seen when the serum was given three days before the tuberculin.

May 13, 1896. 4 *pigs were tested on the fifty-first day.* The serum was given intraperitoneally in doses of from 8 to 10 c.c.; the tuberculin subcutaneously in simultaneous doses of 0.300 c.c. 2 pigs that received serum and tuberculin died in 10 to 12 hours; 2 pigs used as controls and receiving tuberculin only died in 10 hours.

Result. Inconclusive; there was no better absorption of the serum infiltrate.

April 28*th.* 12 pigs of an average weight of 529 grammes were inoculated in the groin with sputum that was of moderate virulence (though two died in from 28 to 29 days).

May 28*th.* 10 *pigs were tested on the thirtieth day.* The serum was given subcutaneously in simultaneous doses of from 3 to 12 c.c. Tuberculin in a separate place in divided doses: 12 M., 0.300 c.c.; 6 P.M., 0.200 c.c. Of 7 pigs that received serum and tuberculin, 3 survived, while 4 died in from 9 to 10 hours; control, of 3 pigs receiving tuberculin, only 2 survived; 1 died in 15 hours.

Result. The serum infiltrate was not well absorbed, though the depression from the tuberculin was not marked until after the second dose. The controls had a higher temperature following the first dose. The lesions were not uniform and the controls were too few. No conclusion was warranted.

July 11, 1896. 20 pigs of an average weight of 496.7 grammes were inoculated intraperitoneally with a small drop of the juice of very virulent tuberculous tissue.

August 1*st. We tested* 10 *pigs on the twenty-first day.* All were very ill with acute tuberculosis. Serum was given intraperitoneally; tuberculin subcutaneously at the same time to 7 pigs; the dose of the tuberculin was 0.400, of the serum 2 to 8 c.c. 1 survived, while 6 died in from 6 to 22 hours; 3 control pigs that received tuberculin only died in 9 hours.

Result. Autopsies revealed acute miliary tuberculosis very much alike in all. The amount of serum absorption was doubtful. The result seemed slightly favorable to the serum, but the condition of the animals was bad for the test.

Serum of Ass H, First Bleeding.

May 27, 1896. 10 pigs of an average weight of 534 grammes were inoculated in the groin with a non-virulent sputum, which kills in 60 days.

July 17*th. They were tested* (*fifty-first day*). Serum was given intraperitoneally in doses of from 2 to 10 c.c.; tuberculin subcutaneously in simultaneous doses of 0.400 c.c. Of 5 pigs that received serum and tuberculin 2 survived and 3 died in from 6 to 9 hours; of 5 control pigs that received tuberculin only 3 survived, while 2 died in from 6 to 11 hours.

Result. The serum evidently was not absorbed to any extent. The lesions were not uniform, though the controls were of sufficient number to neutralize that objection. Evidently no conclusion was warranted, as too many controls survived.

July 11, 1896. 10 pigs from a lot of 20 were inoculated intraperitoneally with very virulent material (see previous experiment, July 11th); 2 pigs that died were not used; all became very ill.

August 1*st.* 8 *pigs were tested* (*twenty-first day*). Serum was given intraperitoneally in doses of from 2 to 8 c.c.; tuberculin subcutaneously in simultaneous doses of 0.400 c.c. Of 4 pigs that received both serum and tuberculin 1 survived and 3 died in from 5 to 10 hours; the 4 controls that received tuberculin only died in from 6 to 10 hours.

Result. The lesions were very uniform and were those of acute miliary tuberculosis. The serum was probably unabsorbed, and the condition of the animals was bad for the test. No conclusions were warranted.

Comparisons Between Various Serums, etc.

The following experiments were made to compare the effects of various serums when given with and without tuberculin. In explanation of the serums tried which were other than our own products, it may be stated that:

"Cow D." Was obtained from an animal that had recovered from pulmonary tuberculosis and had been injected with large quantities of tuberculin.

"Horse I." Was said to have been treated with tuberculous "toxins" from virulent cultures without bacilli.

"Horse II." Had been inoculated subcutaneously with non-virulent cultures.

"Horse III." Was said to have been treated with "toxins" from virulent bacilli freed from the culture fluid.

"Ass M." Was a tuberculinized healthy ass.

In addition to the anti-tuberculous serums we used normal horse serum, diphtheria antitoxin from the New York City Board of Health, sheep serum from a healthy sheep, and a 0.6 per cent. NaCl solution.

July 28, 1896. *To test the serum from cow D*, 10 pigs of an average weight of 714 grammes were inoculated in the groin with virulent tissue juice from a tuberculous pig; 5 died before the test in from 40 to 50 days.

September 28*th. We tested* 5 *pigs on the sixty second day.* Serum was given subcutaneously, mixed with tuberculin, to 3 pigs, the serum in doses of 5, 5, and 8 c.c., the tuberculin in a dose of + 0.400 c.c.; all died in from 4 to 7 hours; 2 control pigs received 0.400 c.c. of tuberculin and both died in from 3 to 5 hours.

Result. All the serum was absorbed. The lesions were uniformly advanced caseous tuberculosis. No conclusion could be drawn, as the dose of tuberculin was probably excessive.

August 24, 1896. *To test the serums from cow D and horse I*, 10 pigs of an average weight of 714 grammes were inoculated in the groin with virulent tissue juice from a tuberculous pig; 2 died on the 43d day.

October 7th. We tested 8 pigs on the forty-fourth day. Serum was given subcutaneously, mixed with tuberculin; 3 pigs receiving the serum from cow D in doses of 2.8, 2.6, and 2.7 c.c. + 0.300 tuberculin died in from 6 to 8 hours; 2 pigs that received the serum from horse I in doses of 2.36 to 2.64 c.c. + 0.300 tuberculin died in 8 hours. Of 3 controls that received 0.300 c.c. tuberculin only 1 survived and 2 died in 8 hours.

Result. The serum infiltrate was not well absorbed, and the dose of tuberculin was too large. No effects favorable to the serums could be seen.

October 12, 1896. *We tested the serums of cow D and ass H, first bleeding.* 10 pigs of an average weight of 657.4 grammes were inoculated in the groin with a pure culture of virulent tubercle bacilli that killed in from 40 to 50 days.

They were tested on the thirty-second day. Serum was given subcutaneously to guinea-pigs in dose of 0.005 to 1 gramme of pig, diluted with equal quantities of a 0.6 per cent. NaCl solution. Tuberculin in a dose of 0.0006 to 1 gramme of pig, diluted, was given subcutaneously 30 minutes later, on the opposite side of the abdomen; 5 pigs received the serum of cow D in doses of from 2.5 to 2.75 c.c. and tuberculin in amounts of from 0.250 to 0.450; 1 survived, 4 died in from 10 to 14 hours; 2 pigs received the serum of ass H in doses of 2.5 and 2.75 c.c. and tuberculin in doses of 0.250 and 0.450; both died in from 9 to 10 hours; 3 controls received tuberculin only in doses of from 0.250 to 0.450 and died in from 9 to 13 hours.

Result. The serum was incompletely absorbed, except in the pig that survived. The lesions were very uniform and showed generalized tuberculosis with beginning caseation. Very little, if any, protective influence of the serum could be seen.

August 23, 1897. *Serum of horse II.* 5 pigs of an average weight of 508 grammes were inoculated in the right groin with a virulent first culture.

September 25*th. They were tested on the thirty-third day.* 3 pigs received serum subcutaneously in a dose of 0.005 to 1 gramme of pig and tuberculin in a dose of 0.200; 1 survived, 2 died in 12 hours; 2 pigs received tuberculin only in the same dose and died in 12 hours.

Result. Slightly favorable to serum protection in one pig.

The following experiment is so instructive that we give the full details in tabular form. The apparently marked protective influence exerted by both the serums and the physiological salt solution illustrates the fallacies in deductions of supposed specific effects of the serum as determined by such tests.

November 23, 1896. *We tested the serums of horse II, rabbit VIII, and ass R in a* 0.6 *per cent. NaCl solution.* 19 pigs of an average weight of 517 grammes were inoculated with a pure culture of tubercle bacilli of moderate virulence that killed in from 50 to 60 days.

We tested 13 *pigs on the forty-second day* with serum and salt solution, in a dose of 0.006 to 1 gramme of pig, diluted with an equal quantity of water; it was given subcutaneously in the right side, and tuberculin in a dose of 0.0002 to 1 gramme of pig, diluted with water, was given subcutaneously, 45 minutes later, in the left side. 5 pigs received the serum of horse II in doses of 2.58 c.c. to 3.90 c.c.; 1 died in 15 hours, 4 survived; 2 pigs received the serum of rabbit VIII in doses of 3.48 to 3.51 c.c. and both survived; 6 controls received tuberculin only, and all died in from 7 to 11 hours.

We tested 5 pigs on the forty-fifth day. 1 pig that received 2.70 c.c. of the serum of ass R survived; 2 pigs that received 0.6 per cent. NaCl, 3.00 to 3.19 c.c., survived; 2 controls died in 10 hours. See Table I. (A) and (B).

Result. The lesions in this lot of animals were very uniform, and the favorable showing for the serums seemed more than a coincidence. The tuberculin reaction was typical in the organs, the spleens being enormously enlarged and ecchymotic; there was free serum in the cavities; other local congestions were marked. The serum infiltrate seemed to be absorbed but slightly in most animals, even after two days.

The results seen in Tables I. (A) and (B) led us to make comparative tests of various non-specific serums and of salt solution under the same conditions. The number of animals in some cases was too small to make the results of any value, but they are suggestive. Some experiments are conveniently tabulated.

November 13, 1897. *The serum of horse II and normal horse serum "N."* 27 pigs of an average weight of 537 grammes were inoculated in the right groin with a culture of fair virulence; 5 died. The serums and tuberculin were given subcutaneously and in different places 45 minutes apart; the serum in doses of 0.006 to 1 gramme of pig, the tuberculin in doses of 0.200 to 0.500 in pigs Nos. 1 to 15, and in doses of from 0.100 to 0.500 in pigs Nos. 15 to 23. Of 8 pigs that received the serum of horse II, 2 survived and 6 died in from 9 to 15 hours. 6 pigs received the serum of horse "N," 2 survived, while 4 died in from 10 to 18 hours. (See Table II.)

Result. The lesions were fairly uniform, but the test was too equivocal for any value, and the serum infiltration was not so well absorbed as in Table I.

November 2, 1896. *Hydrocele fluid.* 3 pigs were inoculated with a culture of tubercle bacilli of moderate virulence.

They were tested on the sixty-sixth day. Hydrocele fluid (0.006 to 1 gramme of pig) was injected subcutaneously after diluting it one-half; tuberculin, in a dose of 0.0002 gm. to 1 gramme of pig, was given subcutaneously 15 minutes later. (See Table III.)

Result. No conclusion could fairly be made.

December 30, 1896. *We tested the serums of horse I, ass R 2d, ass H 2d, and a* 0.6 *per cent. NaCl solution.* 16 pigs of an average weight of 558.5 grammes were inoculated in the right groin with a virulent pure culture, that killed in from 30 to 50 days.

They were tested on the fortieth day. The serum of horse I was given in a dose of 0.006 to 1 gramme of pig; the serum of ass R 2d, the serum of ass H 2d, and a 2 per cent. of NaCl, 0.006, were given in the same dose; the tuberculin was given in a dose of 0.0002 to 1 gramme of pig, 40 minutes after the serum. The serum was given subcutaneously on the left side; the tuberculin on the right side; both were diluted one-half with water. (See Table IV.)

TABLE I (A).—TEST OF 13 PIGS ON FORTY SECOND DAY.

No.	Weights.			Serum, kind.	Serum, 12 M. Dose.	Tuberc. 12.45 P.M. Dose.	Temp.		Condition. 7 P.M.	Died.		Days survived or killed.	Autopsies.
	XI/23,'96	I/4, '97	Gain or loss.				12 M.	7 P.M.		Hour.	Hours.		
1	430gm.	430gm	0gm.	Horse II	2.58 c.c.	0.086	102.5°	103°	Lively	......	......	Survived 17 days	General caseous tuberculosis.
2	680	645	—35	"	3.87	0.129	103.5	101	Fair	......	......	Survived 16 days	General caseous tuberculosis (less).
3	460	465	+ 5	"	2.79	0.093	103	101	"	......	......	Killed 2d day	Acute tuberculosis, beginning caseation; some infiltrate at site of injection.
4	660	650	—10	"	3.90	0.130	103	102	"	......	......	Survived 14 days	General caseous tuberculosis.
5	465	460	— 5	"	2.76	0.092	103.5	101	"	3 A.M.	15	....	Acute tuberculosis; ruptured spleen; serum partly unabsorbed.
6	610	580	—30	Rabbit I	3.48	0.116	102.5	101	Weak	......	......	Survived 1 day	Acute tuberculosis; serum all absorbed.
7	565	585	+20	"	3.51	0.117	102.8	103	Depressed	......	......	Survived 1⅓ day	" " " " "
8	685	620	—65	Control	0	0.124	103.3	95	Dying	9.30 P.M.	9	....	" miliary tuberculosis; beginning caseation.
9	535	675	+140 (pregn't)	"	0	0.135	102	97	Weak	......	9	....	" " " " "
10	562	550	—12	"	0	0.115	102	98.5	Depressed	10 30	11	....	" " " " "
11	540	540	0	"	0	0.108	101.5	105	Weak	......	11	....	" " " " "
12	490	465	—25	"	0	0.093	103.5	......	Dying	7.30	7	....	" " " " "
13	505	515	+10	"	0	0.092	103.5	101	Weak	9.30	9½	....	" " " " "
14	590	......	......	......	......	......	......	......	....	Dec. 28, 1896		35th day of disease	

TABLE I (B).—TEST OF 5 PIGS ON FORTY-FIFTH DAY.

No.	Weights.				12.30 P.M.	1 P.M.	12.30 P.M.	7.30 P.M.					
		1/7,'97											
15	425 gm.	450 gm.	+25 gm.	Ass R.I.	2.70 c.c.	0.090	101°	104.5°	Lively	......	......	Killed 2d day	General miliary tuberculosis; beginning caseation; serum infiltrate still under skin.
16	425	500	+75	NaCl	3.30	0.100	101.6	102	Weak	......	......	" "	" NaCl solution absorbed.
17	390	365	—25	"	3.19	0.073	102.5	106	Lively	......	......	" "	" " " " " "
18	485	435	—50	Control	0	0.087	101.5	99.5	Weak	11 P.M.	10	....	" " " " " "
19	499	525	+26	"	0	0.108	102	101.8	"	"	10	....	" " " " " "

TABLE II.—TESTED 23 ON FORTY-SECOND DAY.

No.	Weight.			Serum, kind.	Serum, 12 M. Dose.	Tuberc. 12.45 P.M. Dose.	Temp.		Condition.		Died. Hours.	Survived or killed.	Autopsies.
	XI/13,'97	XII/25,'97	Gain or loss.				12 M.	6 P.M.	12 M.	6 P.M.			
1	662gm.	580gm.	—82gm.	Horse II	3.48 c.c.	0.232c.c.	102°	96°	Good	Fair	15	....	General tuberculosis; beginning caseation of liver and spleen; some infiltrate from the serum.
2	600	480	—120	"	2.88	0.192	103.5	97	"	"	9	....	General tuberculosis; beginning caseation, liver, etc.; serum infiltrate unabsorbed.
3	490	400	—90	"	2.40	0.160	100	97.5	Poor	Weak	10	....	General tuberculosis; more caseation of liver.
4	470	360	—110	N	2.16	0.144	100.6	98.5	Fair	"	10	....	General tuberculosis; beginning caseation; serum infiltrate unabsorbed.
5	620	565	—55	0	0	0.226	101.5	102	"	Fair	...	28 hours	General tuberculosis; beginning caseation; spleen not large.
6	560	500	—60	0	0	0.200	101.8	102	"	"	...	Surv. 12 dys	Gen. tuberc.; slight caseation; spleen not large.
7	490	415	—75	N	2.49	0.166	102.6	96.5	"	"	10	....	General tuberculosis; more caseation; serum infiltrate unabsorbed.
8	425	380	—40	II	2.28	0.152	103	98.5	Poor	"	15	....	General tuberculosis; slight caseation; serum infiltrate fairly absorbed.
9	405	360	—45	0	0	0.144	101.5	96	Good	Weak	10	....	General tuberculosis; beginning caseation.
10	365	340	—25	II	2.04	0.136	102.8	102	"	Fair	...	Surv. 22 dys	General tuberculosis; slight caseation; marked caseation of the lungs.
11	355	340	—15	0	0	0.136	103.8	104.5	"	"	...	" 45 "	General tuberculosis; marked caseation.
12	385	340	—45	N	2.04	0.136	103.8	103.5	Fair	"	...	" 18 "	Gen. tuberc.; marked caseation except spleen.
13	465	430	—35	II	2.58	0.172	102.2	96.5	Good	Weak	10	....	General tuberculosis; beginning caseation; serum infiltrate unabsorbed.
14	435	360	—75	0	0	0.144	104.4	105	Poor	Fair	...	Surv. 22 dys	Gen. tuberc.; more caseation; marked in lungs.
15	350	370	+20	0	0	0.074	102.5	101.8	Good	"	15	....	General tuberculosis; beginning caseation.
16	555	560	+ 5	N	3.36	0.112	102.2	100	"	Strong	...	Surv. 37 dys	General tuberculosis; massive caseation in lungs; not in liver or spleen.
17	500	510	+10	N	0	0.102	102.2	102	"	"	15	....	General tuberculosis; beginning caseation.
18	705	560	—145	0	0	0	97	......	Weak	Weak	12	Not treat'd; too weak	General tuberculosis; advanced caseation of liver and spleen.
19	495	430	—65	0	0	0.086	103.6	95	Fair	Fair	10	....	General beginning caseous tuberculosis.
20	470	430	—40	II	2.58	0.086	102	100	"	"	15	....	General beginning caseous tuberculosis; serum fairly absorbed.
21	560	525	—35	0	0	0.105	103	100.5	Good	"	18	....	Ruptured liver; general tuberculosis.
22	395	400	+ 5	II	2.40	0.080	102.5	103	"	"	...	Surv. 5 dys	General tuberculosis; beginning caseation; spleen small.
23	400	340	—60	N	2.04	0.068	102.5	99.8	"	Weak	18	....	General tuberculosis; slight beginning caseation; serum unabsorbed.

TABLE III.

No.	Weights.			Serum.		Tuberc. 12.45 P.M. Dose.	Temp.		Condition. 7.30	Died or killed.		Autopsies.
	XI/2,'96.	I/7,'97	Gain or loss.	Kind.	12.30 P.M. Dose.		12.30 P.M.	7.30 P.M.		Hours.	Days.	
1	705gm.	610gm.	— 95gm.	NaCl	3.66 c.c.	0.122 c.c.	102.4°	100°	Fair	24	1	General caseous tuberculosis; serum infiltrate not absorbed from skin.
2	710	510	—200	Control	0	0.102	95	......	Dying	8	......	General caseous tuberculosis.
3	710	630	— 70	"	0	0.126	102	103.2	Fair	...	VI/2,'97	Chronic caseous tuberculosis (Albino).

TABLE IV.

No.	Weights.			Condition.	Serum.		Tuberc. Dose.	Temp.		Condition. 6 P.M.	Died or killed.		Autopsies.
	XII/30,'96	II/8,'97	Gain or loss.		Kind.	Dose.		12 M.	6 P.M.		Hours.	Days.	
1	655gm.	625gm.	—30gm.	Fair (doe)	Ass R	3.75 c.c.	0.125c.c.	103°	100.4°	Fair	15	......	General caseous tuberculosis; serum infiltrate not all absorbed.
2	545	585	—60	"	" "	2.90	0.097	102.2	102.6	"	...	K. 10	General caseous tuberculosis.
3	610	545	—65	Poor	Ass H	3.27	0.109	102.4	103.4	"	...	2½	General caseous tuberculosis; serum well absorb'd
4	640	585	—55	Good (doe)	" "	3.50	0.117	102.6	99.2	Weak	10	......	General caseous tuberculosis; serum infiltrate not well absorbed; more caseation.
5	670	620	—50	"	Horse I	3.72	0.124	102.4	103.2	Fair	...	K. 9	General caseous tuberculosis; moderate caseation
6	445	385	—60	Poor	" "	2.30	0.077	102.6	99.6	Weak	...	D. 9	General caseous tuberculosis; slight beginning caseation.
7	525	410	—115	Ill	NaCl	2.46	0.082	101.4	103.2	Fair	15	......	" " " "
8	490	425	—65	Fair (doe)	"	2.55	0.095	103	104	"	...	K. 10	" " " "
9	525	440	—85	Poor	Control	0	0.088	101.2	95	Weak	15	......	" " " "
10	525	470	—55	Good	"	0	0.094	103.2	101.4	"	9	......	" " " "
11	620	610	—10	"	"	0	0.122	102.2	104.5	Fair	...	K. 9	" " " "
12	655	......	......	......	......	......	......	......	......	......	Died	I/10,'97	Emaciated; acute peritonitis.
13	480	......	......	......	......	......	......	......	......	......	"	I/11,'97	Emaciated; nearest lymph nodes tuberculous.
14	450	......	......	......	......	......	......	......	......	......	"	I/27,'97	Emaciated; nearest lymph nodes and spleen tuberculous.
15	590	......	......	......	......	......	......	......	......	......	"	II/6,'97	General caseous tuberculosis.

Result. These animals revealed fairly uniform lesions much like those in Tables I. (A) and (B), and at nearly the same stage in the disease. All had caseous retroperitoneal lymph nodes; enlarged, and beginning caseous, liver and spleen, and miliary tuberculosis in the lungs. The amount of caseation varied, being somewhat less in Nos. 6, 7, 8, and 11 (Table IV.) than in the rest. This latter factor seemed to influence the severity of the poisoning by tuberculin, which is usually more marked the greater the caseation and the age of the disease. Therefore the experiments in Tables III. and IV. have little use for safe deductions.

January 5, 1897. *We tested the serums of cow D, ass R 2d, a normal sheep, and* 0.6 *per cent. NaCl solution.* 10 pigs of an average weight of 483.4 grammes were inoculated with a culture of tubercle bacilli of moderate virulence from the same source as in the experiment of November 23, 1896.

February 16*th. We tested them on the forty-second day.* The serums, etc., were given subcutaneously, diluted with an equal volume of 0.6 per cent. NaCl, giving 0.004 to 1 gramme of pig; tuberculin, diluted, was given subcutaneously, 45 minutes later, in a dose of 0.0002 to 1 gramme of pig; 2 pigs that received the serum of cow B died in from 12 to 20 hours; of 2 pigs that received the serum of ass R 2d, 1 survived and 1 died in 12 hours; of 2 pigs that received the serum of a sheep (normal), 1 survived and 1 died in 9 hours; 2 pigs received NaCl in 0.6 per cent. solution, and died in from 9 to 10 hours; 2 controls died in from 9 to 12 hours.

Result. The infiltrations from the ass and cow serums were not well absorbed; the others were entirely so. The NaCl seemed completely absorbed when the tuberculin was given. The lesions were very uniform. Possibly some protection was shown by the serums.

January 20, 1897. *We tested the serums of horse II and diphtheria antitoxin* (300 *units*). 10 pigs of an average weight of 529.2 grammes were inoculated in the groin with a culture of tubercle bacilli of moderate virulence (2 died before testing).

February 26*th. We tested* 8 *pigs on the thirty-seventh day.* The serums were given subcutaneously, diluted with an equal volume of water in a dose of 0.005 to 1 gramme of pig (2 to 4 c.c.); the tuberculin, diluted, was given subcutaneously, 40 minutes later, in a dose of 0.0006 to 1 gramme of pig (0.234 to 0.489 c.c.); 4 pigs that received the serum of horse II died in from 7 to 11 hours; of 2 pigs that received diphtheria antitoxin, 1 survived, while 1 died in 6 hours; 2 controls died in from 8 to 11 hours.

Result. The serums were not perfectly absorbed and the dose of tuberculin was so large that no deduction is warranted.

Note.—These animals had been used on the twenty-second day of the disease with the serum of ass R 1st and small doses of tuberculin (see experiment of January 20, 1897).

February 19, 1897. *We compared the serum of ass R, second bleeding, and a* 0.6 *per cent. NaCl solution.* 16 pigs of an average weight of 437.5 grammes were inoculated in both groins with a culture of tubercle bacilli of weak virulence (all but 3 pigs had gained weight at the end of two months).

April 23*d. We tested all on the sixty-third day.* The serum and the NaCl were given, undiluted, subcutaneously in a dose of 1 to 2 c.c.; tuberculin, diluted, was given 1¼ hours later, subcutaneously, in a dose

TABLE V.

No.	Days inoculated.	Weight.		Tuberc. 12 M.	0.6 per cent. NaCl solution.				Temperature.		Survived or died.	Autopsies.
		11/18,'97	Loss or gain.			Dose. 12 M.	Dose. 3 P.M.	Dose. 6 P.M.	12 M.	5.30 P.M.		
1	50	350gm.	—125gm.	0.350	Control	0	0	0	100°	Dying	6 hours	General tuberculosis; slight cascation; reaction.
2	50	475	— 75	0	"	0	0	0	102	104.4°	K. after 24 hours	General tuberculosis; slight caseation; tuberculin not given.
3	50	555	—115	0.555	NaCl	3.33 c.c.	3.30 c.c.	3.50 c.c.	104.2	100.2	15 hours	General tuberculosis; NaCl nearly all absorbed; reaction apparent.
4	50	565	— 55	0.566	"	3.39	3.29	3 50	103.2	101.2	11 hours	" " " "
5	44	430	— 40	0.430	"	2.50	2.50	2.50	103.2	105	Survived	" " " "
6	44	505	+ 70	0.505	Control	0	0	0	102.2	99.4	10½ hrs.	" " " "

TABLE VI. (A).

No.	Inoculation.	Test day.	Weight.		Serum, etc. January 29th.		Temperature. January 28th.		Temperature. January 29th.		Temp. variation.	Condition.	
			XI/5,'96	I/28,'97	Kind.	Dose.	11.30 A.M.	5.30 P.M.	11.30 A.M.	5.30 P.M.			
1	XI/5,'96	85th	395 gm.	510 gm.	Control	0	102.5°	101.6°	101°	101°	0	Fat	
2	"	"	285	340	Rabbit I	1.70 c.c.	102	102	99.2	102	+2.8°	Thin	
3	"	"	475	525	Ass R 2	2.62	102.5	101.2	102	101.4	+1.6	Fat	
4	"	"	445	540	NaCl	2.70	102	101.6	100.2	101.6	+1.4	"	
5	X/5,'96	116th	480	420	Ass R 2	2.10	102	101.4	101.2	102	+0.8	Poor	Died in 18 hours; was quite ill.
6	"	"	380	500	"	1.25	101.5	100.4	101.2	100.8	—0.4	Good	
7	"	"	....	545	"	2.77	101	100.3	101	100.4	—0.6	"	
8	Not inoculated.		....	470	"	2 00	......	......	101	101.2	+0.2	"	

of 0.300 c.c.; 6 pigs that received the serum of ass R, 2d, all died in from 7 to 11 hours; 3 pigs that received NaCl solution, all died in from 7 to 9 hours; of 7 controls, 2 survived and 5 died in from 9 to 12 hours.

Result. The serum infiltration was not completely absorbed; the NaCl solution was entirely so. The lesions were very uniform and showed chronic fibro-caseous lymph nodes; very large, slightly caseous spleen; beginning caseation in the liver; miliary tuberculosis of the lungs. The dose of tuberculin was rather larger than was necessary for most of the animals; no influence could be seen.

Serum of ass M. 3 pigs were taken 55 days after infection (*a*); 2 pigs, 6½ months after infection (*b*); tuberculin was given 40 minutes later than the serum. (*a*) 2 pigs received the serum of ass M in a dose of 1 and 2 c.c. subcutaneously, and tuberculin, 0.100 c.c.; 1 survived and 1 died in 10 hours; 1 control-pig injected subcutaneously with tuberculin, 0.100 c.c., died in 12 hours; (*b*) 1 pig received of the serum of ass M 2.5 c.c., and of tuberculin, 0.100 c.c.; it died in 10 hours; 1 control-pig received tuberculin, 0.100 c.c., and died in 12 hours. (See Table V.)

Result. There was no certain protection.

A 0.6 *per cent. NaCl solution in repeated doses, with large doses of tuberculin.* 6 pigs of an average weight of 480 grammes received 4 inoculations on December 30, 1896, and 2 inoculations on January 5, 1897, of a pure culture of tubercle bacilli of moderate virulence; NaCl solution was given in a dose of 0.006 to 1 gramme of pig, and tuberculin in a dose of 0.001 to 1 gramme of pig.

Result. The excessive doses of tuberculin and the prolongation of life in the animals that received the NaCl solution suggest that the influence of the latter may be due to a supporting effect on the failing hearts of the poisoned animals by adding bulk to the blood or diluting and promoting the excretion of the poison.

May 27, 1897. 0.6 per cent. NaCl *solution in a single dose.* 15 pigs of an average weight of 676.7 grammes were inoculated in the groin with a first culture of virulent tubercle bacilli; 4 died in from 5 to 34 days.

July 2, 1897. *We tested* 11 *on the thirty-sixth day.* The NaCl solution was given subcutaneously to six in a dose of 0.010 to 1 gramme of pig; the tuberculin, subcutaneously, in a dose of 0.150 to all, 15 minutes later; of the 6 pigs that received NaCl solution in doses of 4.75 to 7.30 c.c., 2 survived and 4 died in from 6 to 12 hours; of 5 controls that received tuberculin only, 3 survived and 2 died in from 6 to 12 hours.

Result. No protective influence of the NaCl can be seen in this experiment, though it seems apparent in some others. The lesions showed virulent infection, but not uniform caseation.

Effect of the serums on the temperature of tuberculous guinea-pigs (without tuberculin). Serum of ass R, second; serum of rabbit VIII; and solution of the NaCl, 0.6 per cent. Miscellaneous pigs, inoculated with non-virulent tubercle bacilli and having chronic disease, were used. (See Table VI.)

Result. There was apparently no influence on the temperature.

Test 3 *days later of the first four pigs* (Table VI., B) *with tuberculin.*

Ass R, second serum, was given in separate places at the same time, subcutaneously.

TABLE VI. (B).

No.	Serum.		Tuberc.	Temperature.		
	Kind.	Dose.	Dose.	A. M.	P. M.	Variation.
1	Ass R 2	2.15 c.c.	0.015 c.c.	101°	105°	+4°
2	0	0	0.010	101	104	+3
3	0	0	0.015	102.4	104.6	+2.2
4	Ass R 2	2.70	0.0155	101.6	102.4	+1.8

Result. There was no effect in preventing a rise of temperature.

January 20, 1897. *Effects of serum on the temperature when given with small doses of tuberculin.* 10 pigs were inoculated with bacilli of moderate virulence. (1 died of enteritis.)

They were tested on the twenty-second day. The serum of ass R, second, and NaCl, 0.6 per cent. solution, were given in doses of 0.004 to 1 gramme of pig, diluted one-half; tuberculin in a dose of 0.0005 to 100 grammes of pig; they were given in separate places at the same time, subcutaneously.

TABLE VII.

No.	Weight.			Serum, etc.		Tuberc.	Temperature.		
	I/20,'97	II/11,'97	Gain or loss.	Kind.	Dose.	Dose.	12 M.	6 P.M.	Variation
1	665 gm.	605 gm.	—60gm.	Ass R 2	2.40 c.c.	0.003 c.c.	102.2°	102.2°	0
2	400	395	— 5	"	1.58	0.0019	103.6	105	+1.4°
3	390	400	+ 5	"	1.60	0.002	108.8	104.4	+0.6
4	420	415	— 5	"	1.66	0	102	102.6	+0.6
5	375	345	—30	NaCl	1.48	0.0017	102	101.6	—0.4
6	390	440	+50	"	1.76	0.022	103	103.6	+0.6
7	445	450	+ 5	Control	0	0.022	102.2	104.6	+2.4
8	610	610	0	0	0	0.003	102	103.6	+1.6
9	920	875	—45	0	0	0.0043	103	104.8	+1.8
10	....	....	....	....	....	....	......	......	....

Result. The controls seemed to have a greater rise of temperature, but the NaCl pigs seemed to have less rise than the serum animals, thus making a specific effect of the serum less likely.

January 20, 1897. *Serum of ass R, second bleeding, and of horse II.* 6 pigs of an average weight of 492.5 grammes were inoculated with a pure culture of tubercle bacilli.

The test was on the twenty-fourth day. Serum was given in doses of 0.006 to 1 gramme of pig; tuberculin in doses of 0.0005 to 100 grammes of pig; they were given simultaneously, in separate places under the skin.

TABLE VIII. (A).

No.	Weight.			Serum. Ass R 2	Tuberc.	Temperature.		
	I / 20,'97	II / 18,'97	Gain or loss.	Dose.	Dose.	12.30 P.M.	5.45 P.M.	Variation.
1	475 gm.	450 gm.	—25gm.	2.70 c.c.	0.0022 c c.	102. 8°	104. 6°	+1. 8°
2	555	545	—10	3.27	0.0032	102. 2	Died soon after dose (shock)	
3	430	415	—15	2.49	0.0024	102. 8	104. 4	+1. 6
4	480	400	—80	Control	0.0024	103. 8	105. 2	+1. 4
5	500	535	+35	"	0.0020	103. 2	104. 4	+1. 2
6	515	505	—10	"	0.003	102. 6	102. 8	+0. 2

Result. The serum did not prevent the temperature rise due to tuberculin.

The serum of horse II was tested on the forty-second day. Serum was given in a dose of 0.004 to 1 gramme of pig; tuberculin in equal volume was given subcutaneously 10 minutes after the serum.

TABLE VIII. (B).

No.	Weight.			Serum.		Tuberc.	Temperature.		
	I / 20,'97	III / 4,'97	Gain or loss.	Kind.	Dose.	Dose.	10.30 A.M.	5.45 P.M.	Variation
4	480 gm.	380 gm.	—100gm.	Horse II	1. 10 c.c.	0. 076 c.c.	102°	104. 4°	+2. 4°
3	430	420	—10	"	1. 68	0. 084	102. 2	105	+2. 8
6	515	520	+5	"	2. 08	0. 104	102. 4	99	—3. 4
1	475	435	—40	Control	0	0. 097	101. 8	103	+1. 2
5	500	555	+55	"	0	0. 111	102	105	+3

Result. There was no influence upon the effect of non-fatal, large doses of tuberculin.

January 5, 1897. *Serums of horse I and horse II.* 10 pigs were inoculated with a pure culture of tubercle bacilli of moderate virulence. (See Table IX.)

They were tested on the forty-ninth day. The serum and the tuberculin were given in separate places under the skin of the abdomen, simultaneously.

TABLE IX.

No.	Weight.			Serum.		Tuberc.	Temperature.		
	I / 5,'97	II / 23,'97	Gain or loss.	Kind.	Dose.	Dose.	12.30 PM	5.30 P.M.	Variation
1	440 gm.	280 gm.	–60gm.	Horse I	2.0 c.c.	0.002 c.c.	101.2°	105°	+3.8°
2	455	465	+10	"	1.5	"	102.4	105.4	+3
3	377	405	+28	"	1.5	"	103.2	104.4	+1.2
4	777	760	–17	Horse II	2.0	"	101.2	105.2	+4.0
5	360	410	+50	"	1.0	"	103	105.8	+2.8
6	760	630	–130	"	1.5	"	103.2	104.6	+1.4
7	407	465	+58	Control	0	"	102.2	104.8	+2.6
8	792	785	– 7	"	0	"	102.2	104.2	+2
9	490	470	–20	"	0	"	103	105.6	+2.6
10	685	690	+ 5	"	0	"	103	104.2	+1.2

Result. There was evidently no preventive effect on the temperature reaction.

March 27, 1897. *Effect of the serums of R and H on the local reaction after tuberculin injections into the eyes of rabbits* (see Part I.). Three weeks after discontinuance of treatment and 56 days after the inoculation of the eyes, the congestion of the acute stage in the disease was decreasing; some eyes had become caseous to a large extent. A small dose (0.010) of tuberculin was given to 5 of the animals (not mixed with serum); serum was given at the same time. 2 received 3 c.c. each of serum R; 2 received 3 c.c. each of serum H; 1 control received tuberculin only.

Result. There was slight additional redness in all, with a temperature of 104.5°, an increase of 2° to 2.5° after six hours. This was not less with the serum rabbits.

April 1, 1897. The test was repeated with three controls; the dose of tuberculin was 0.020.

Result. There was slight increase of congestion and temperature in all, without perceptible difference between the controls and the serum animals. There was no influence in preventing local reaction.

RÉSUMÉ. The results of our four years' work in experiments upon four sheep, three asses, twelve fowls, eighteen rabbits, and four hundred and fifty guinea-pigs are to be found in the following summary:

1. A sheep was injected intravenously with killed thymus cultures. The result was so unsatisfactory that the serum-tests were not conclusive.

2. Chickens were inoculated intraperitoneally with mammalian tuberculosis. The serum revealed no germicidal or inhibitive action on the tubercle bacilli, nor favorable influence on the course of the disease in guinea-pigs.

3. A sheep was injected with tuberculin. The serum was wanting in germicidal, antitoxic, or curative effect so far as tested.

4. A sheep was inoculated intravenously with non-virulent cultures. Cachexia followed, and the serum was therefore not used.

5. An ass was inoculated as in (4.); it died from pulmonary embolus. The serum was not bactericidal to tubercle bacilli.

6. An ass was inoculated with virulent tubercle bacilli and treated with tuberculin. The serum showed no germicidal nor curative, but possibly some antitoxic effect.

7. An ass was inoculated with non-virulent tubercle bacilli and treated with various extracts of tubercle bacilli and dead bacilli. The serum showed no activity.

8. Rabbits were inoculated with non-virulent and virulent tubercle bacilli, and recovered. Their serum possibly conferred some protection in tuberculin poisoning, and possibly prolonged the lives of treated guinea-pigs.

With a full appreciation of the uncertainty of correct conclusions from tests of the serums other than our own product which were tried with tuberculin, we may state that only one indicated antitoxic power. This was obtained from a horse inoculated with non-virulent cultures.

That the apparent protection against fatal tuberculin poisoning occasionally seen was not necessarily due to the specific antitoxic power of the serums is made probable by the similar effects of physiological salt solution seen at times.

None of the serums appeared to prevent local or general reaction from small doses of tuberculin, nor to influence the temperature of tuberculous animals.

Disappointing as these results may seem, the writers feel that, in the light of recent contributions made by Ehrlich, Wasserman and Behring[10] to our knowledge of the mechanism of immunity and antitoxin production in the body, the outlook for an efficient tuberculosis antitoxin is by no means a hopeless one.

In conclusion, we would express our thanks to Drs. S. W. Hewetson, W. S. Nelson, and J. A. Wilder, all of whom have aided in the many arduous details of these experiments.

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REVIEWS.

Studies on the Psychology of Sex. Vol. I. "Sexual Inversion." By Havelock Ellis. London: The University Press, Watford, 1898.

As indicated by its title, this book follows a line of investigation somewhat similar to that pursued some years ago by Kraft-Ebing, and described by him in that extremely popular work, *Psychopathia Sexualis.* There is, however, a difference between Kraft-Ebing's book and the work now before us, in that the former treated of all the known vices or degeneracies, or whatever one may please to call them, while the latter deals with only one, viz., homosexuality. Another great difference which suggests itself consists in the fact that this book, written as it is by the leading criminologist of the day, is bound to command respect and attention; and, although following to a certain extent in the footsteps of Kraft-Ebing, has never been intended by the author for general distribution among the laity.

There will always be a question in the minds of the majority of the medical profession as to just how much good is accomplished by the writing of such books. That the author himself is fully aware of this feeling, and is keenly sensitive upon the subject, is evidenced by the preface to his work, occupying six pages, in which he vigorously defends his studies in this rather unsavory subject.

Again, in one of the concluding paragraphs, he makes the following statement:

"In dealing with it—*i. e.*, the subject of the work—I have sought to avoid that attitude of moral superiority which is so common in the literature of this subject. . . . Such an attitude is as much out of place in scientific investigation as it is in judicial investigation. The physician who feels nothing but disgust at the sight of disease is unlikely to bring either succor to his patients or instruction to his pupils."

While entirely agreeing with these statements, and recognizing both the scientific value of the work and the honesty of purpose of the author in writing it, we must at the same time point out the great necessity for keeping such a book within the bounds of the profession and of discountenancing its general circulation among the laity. In spite of the ingenuous plea which the author makes in his preface for a wider dissemination of knowledge of the sexual instinct, we cannot help but feel that the less young men and young women know of homosexuality the better. To us of the medical profession, however, the book will prove extremely interesting, and will, moreover, demand careful attention and thought.

The opening chapter is of the nature of an introduction, and deals with the general prevalence of sexual inversion. From the stand-point of evolution it is interesting, as pointing out the wide extent of homosexuality among animals.

Historically this chapter is of considerable interest as describing the widespread prevalence of sexual inversion among all the races of the earth and among all sorts and conditions of men.

To some sensitive minds it may come like a shock to hear that David and Jonathan were sexual inverts, as were likewise Michael Angelo, James the First of England, Frederick the Great, Pope Sixtus VI., Walt Whitman, and Paul Verlaine.

Upon the whole, the first chapter is in every respect the most interesting of the volume.

Chapter II. is devoted to a short sketch of the men who have attained considerable reputation by their investigations into sexual perversions, including Casper, Ulrichs, Kraft-Ebing, and Schrenck-Notzing.

The third, fourth, and fifth chapters are devoted to narration of the histories of many cases of homosexuality, both male and female, no details that might prove of interest in these cases being omitted.

The theory of sexual inversion is discussed in the sixth chapter, and very instructive reading it makes. At the outset the author states that the sexual invert is regarded as a social outcast by his friends, as insane by the asylum superintendent, and as a criminal by the police.

Ellis believes that the truth lies in neither one of these three views. Nor does he believe the sexual invert to be necessarily a degenerate—a term, by the way, which Ellis declares "has simply become a term of literary and journalistic abuse." Sexual inversion, according to the author, is a congenital abnormality or predisposition. He states that probably many persons go through the world with this predisposition to sexual inversion latent and unaroused; in others it is aroused by the operation of some exciting cause, chief of which is seduction, "or the initiation of the boy or girl by some older and experienced person in whom the inversion is already developed."

The final chapter of the book deals with the methods to be employed to prevent homosexuality; and here the author offers a strong plea for the coeducation of the sexes, claiming that one of the exciting causes of sexual inversion is the general school system where boys and girls are separated. This is rather a novel argument in support of co-education, and one that the advocates of that measure would hardly call legitimate.

As regards the medical treatment of inversion, the author "strongly advocates discrimination, caution, and skepticism." He is earnestly opposed to the method of Schrenck-Notzing, which, in order to cure the vice of sexual inversion, advocates prostitution, considering such a remedy worse than the disease. As far as really curing these cases is concerned, the author expresses his views as follows:

"We can seldom, therefore, safely congratulate ourselves on the success of any 'cure' of inversion. The success is unlikely to be either permanent or complete in the case of a decided invert. I am inclined to say that if we can enable an invert to be healthy, self-restrained, and self-respecting, we have often done better than to convert him into the mere feeble simulacrum of a normal man."

Such conclusions, arrived at by such an eminent criminologist as Havelock Ellis, are, to say the least, discouraging, and are certainly calculated to cast considerable doubt in the minds of many upon the value of such investigation.

However, to those who are particularly interested in this great social problem we earnestly recommend this work, feeling sure, with the author, that the knowledge here gained will equip them better to enter upon the wider questions of sex. H. M. C.

DIE STÖRUNGEN DES VERDAUUNGSAPPARATES ALS URSACHE UND FOLGE ANDERER ERKRANKUNGEN. Für practische Aertze. Von DR. HANS HERZ. Pp. 543. Berlin: S. Karger.

THE DISTURBANCES OF THE DIGESTIVE APPARATUS AS CAUSES AND RESULTS OF OTHER DISEASES. By DR. HANS HERZ.

THE NATURAL HISTORY OF DIGESTION. The Contemporary Science Series. By A. LOCKHART GILLESPIE, M.D., F.R.C.P. Ed., F.R S. Ed. Illustrated by Figures, Diagrams, and Charts. Pp. 427. London: Walter Scott, Ltd., 1898.

THE study of diseases of the digestive organs has in recent years brought so many new facts to light and has given us such comparative security in diagnosis and treatment, that when our present knowledge is contrasted with what was known but a few years ago, our chief feeling must be one of gratitude for all the productive special work upon this line. But with this feeling there remains a conviction that the methods of examination now adopted in investigating the diseases of this system have acquired too great multiplicity and elaborateness, and that in emphasizing the necessity for complicated and difficult chemical examination of gastric contents and physical examination of the patient, with expensive apparatus or awkward methods, many writers upon this subject discourage practitioners with little special training from any attempts to carry out the simple investigations that are, after all, the most trustworthy and most important. And owing to the interest that now attends the use of these modern methods of determining the local changes that take place in gastro-intestinal affections, such local changes are treated with a comprehensiveness that is in itself entirely laudable, but that causes more general questions to suffer. It seems safe to hazard the casual statement that in the majority of recent works upon diseases of the stomach in especial, the discussion of the methods of determining the existence of local variations from the normal are accorded more space than is the consideration of the effect of diseases of this organ upon other systems and organs. The inevitable result is that the general reader is led into false conceptions, and the important but not absolutely essential matters stand forth with a prominence that obscures the vital relations existing between the digestive system and the general economy. Such statements are, most assuredly, not true of all authoritative recent works, but they are so nearly true of a large percentage that this work of Dr. Herz comes at an opportune time, and must receive a warm welcome. The criticism that first occurs to one is the contrary of that which has just been passed upon special works on gastric diseases. Far from being too narrow, the scope of the work is almost too broad for a volume of this size, and the requisite brevity in discussing the variety of questions that present themselves leaves some of these insufficiently elaborated. The book is, however, such a storehouse of facts, commonplace, curious, rare, and interesting, all combined, that the necessary brevity may be excused in the pleasure that comes from reading it. The relations that the diseases of the organs concerned in digestion bear to the etiology and course of other diseases are discussed in a systematic consideration of diseases of the blood, infectious diseases, and the diseases of the various systems of organs, and, following the treatment of each of these questions, the tables are turned and each of the series is discussed in its relation to the production and perpetuation of digestive disorders.

Throughout the work its scope is even further enlarged and the interest heightened by numerous critical comments upon theories of the causation and nature of various diseases, whether these theories relate to the digestive organs or not, and the author exhibits gratifying calmness of judgment with a healthful skepticism that is inspiring. In a few instances these qualities desert him. One can scarcely admit with him that the theory of the production of certain forms of jaundice by paracholia, or altered direction of cellular secretion, is acceptable because no other theory is; and when Dr. Herz would throw discredit upon the typhoid bacillus as the constant cause of typhoid fever we suspect him of some violence in his iconoclasm. But such examples are uncommon. The book abounds in clear judgments and valuable ideas, and the style is lucid and frequently interspersed with bits of fantastic but penetrating cynicism that render the author's style both convincing and attractive. The chapters on the diseases of the blood, infectious diseases, and diseases of the nervous system are especially commendable in the contrast they offer to the limited discussion commonly accorded them in works devoted to the consideration of the diseases of the digestive tract.

Dr. Gillespie's work also is one that has been greatly needed. No comprehensive collation of this kind exists in recent English literature, and while the developments that have been secured in the study of the more abstract questions relating to digestion have been important, the papers containing them have been so scattered that none but specially interested readers have had opportunity to make themselves familiar with existing views. Dr. Gillespie first presents briefly the ancient theories of the nature of digestion, following this by interesting chapters upon digestive processes in plants, all of which is introductory to the more important consideration of digestion in animals. The structure of the alimentary tract, the probable nature of ferments and the character of their action, and the chemical composition of food-stuffs are discussed briefly before entering upon the description of digestion as it occurs within the body. The following pages contain concise, clear, and well-arranged statements of the action of saliva upon starch, the composition of saliva, the rapidity of its action, and the effect upon its action of varying amounts of hydrochloric acid; the source of hydrochloric acid, the effects of different forms of foods upon its secretion, the digestion of proteids by gastric juice, the effects of different acids as compared with hydrochloric acid, and many related questions left untouched by more purely practical treatises are discussed in a very interesting manner. The description of the actions of pancreatic secretion, bile, and the intestinal secretions follows, and is succeeded by a consideration of the action of the bacteria of the intestines, the process of absorption, and the mechanism of secretion. The nature of the senses of taste, smell, hunger, and thirst are discussed—so far as these questions are at present subject to intelligent discussion. Metabolism is then treated of at sufficient length to give the reader a clear conception of what is known concerning this difficult physiological problem, and the book closes with an extended consideration of diet and foods, describing the physiological essentials of a diet, and then discussing the food elements and many of the more important individual foods in relation to their digestibility and their calorifacient value.

In certain portions the style of the book is rather too technical to be entirely clear, unless the reader understands chemistry fairly well. With this exception, however, there is little to criticise. All the important work that has appeared within the past few years is discussed so far as the limits of the book allow of discussion, and extremely little of value has been omitted. Indeed, the author has compressed so much into a small space that the book is exceedingly valuable for reference concerning questions that are often difficult to settle because of the desultory manner in which authoritative discussion of them has appeared; and it is especially important as a source from which the general medical reader may, without an impossible amount of research and expenditure of time, make himself familiar with the physiology of digestion as this question is now viewed. Not least interesting are the accounts of the author's own original work. The results of part of this have been published previously in separate papers, but both these and the portions that reach the reading public for the first time are valuable and interesting. D. L. E.

MANUAL OF PATHOLOGY, INCLUDING BACTERIOLOGY, THE TECHNIC OF POST-MORTEMS, AND METHODS OF PATHOLOGICAL RESEARCH. By W. M. LATE COPLIN, M.D., Professor of Pathology and Bacteriology, Jefferson Medical College; Pathologist to Jefferson Medical College Hospital and to the Philadelphia Blockley Hospital; Bacteriologist to the Pennsylvania State Board of Health; being a second edition of the author's Lectures on Pathology, Rewritten and Enlarged, with 268 illustrations, many of which are original. Pp. 638. Philadelphia: P. Blakiston, Son & Co., 1897.

IN the preface it is stated that the lectures of the author of this book were published in serial form, the parts being afterward bound and placed on the market. Within a short time this edition was exhausted; the book was then revised and published in the form of the present volume, the larger part having been rewritten. The first edition contained 250 pages and 51 illustrations; the present volume has reached 638 pages and contains 268 illustrations. The most difficult problem for the author has been to keep the volume from reaching undesirable dimensions.

The volume is presented, not as a treatise or book of reference, but, as the title indicates, as a manual which might prove useful in the laboratory, the post-mortem room, and in clinical microscopic diagnosis. To attain the last aim the chapters on Microscopic Examination of Tissue, Blood, and Urine have been fully illustrated. Such is the *raison d'être* and the aim of this recent American work on pathology. Inasmuch as American text-books of pathology are rather rare publications, it will be interesting indeed to observe how the author of the present volume has accomplished his task.

Part I. deals with technical matters; the technique of post-mortem examination occupying forty pages. The illustrations of this part are borrowed from Virchow; in the cut illustrating the preliminary opening of the right ventricle the author has added an incision which, he says, is preferred to the one advised by Virchow, because the papillary muscle attached to the anterior ventricular wall will then be carried over with the ventricular wall, the auriculo-ventricular orifice being thereby better exposed. Virchow's original incision, however, is probably the preferable one, because if the papillary muscle attached to the anterior ventricular wall is cut, then the tricuspid orifice becomes much larger than it really is, as any one can demonstrate to his own satisfaction.

The histological methods are next considered. Many of the illustrations of instruments are, it would seem, superfluous.

The recommendation that pieces of tissue be soaked in different paraffins for forty-eight hours certainly provides for an abundance of time, and the sweeping condemnation of the freezing methods is altogether too emphatic.

The chapters on the Examination of the Urine and of the Blood seem to be as satisfactory as could be expected under the circumstances. Widal's serum-test for typhoid fever is carefully described.

Part II. is devoted to General Pathology, including Bacteriology. It occupies 272 pages. The definitions of hypertrophy and of atrophy are rather peculiar; hypertrophy is defined as "increased functional power, which has a tendency to persist," while atrophy, being the reverse of hypertrophy, is "diminished functional power." The cellular changes which underlie these conditions merit more prominence, because the terms are essentially anatomical in their significance. In the few paragraphs devoted to atrophy it is stated that an atrophic organ is not merely one that is diminished in size or weight, because in the condition known as red atrophy of the liver the organ may be much increased in size; but the student is not told anywhere in the pages of this book what red atrophy of the liver is.

The descriptions of the regeneration of nerves and of bones are rather vague. After reading them over carefully one cannot say that he has obtained a distinct idea as to the chain of events in the regeneration of these structures.

In the section on tumors, page 210, it is stated that glioma occurs in the neuroglia or connective tissue of nerve, and is a form of round-cell sarcoma. In view of the now well-known and generally taught ectodermal origin of neuroglia, this paragraph should be modified.

The remaining pages are devoted to a consideration of the special pathological anatomy of the blood, the serous membranes, the heart and the bloodvessels, the mucous membranes, the respiratory tract, the digestive organs, the spleen and the lymph-glands, and the urinary organs.

The pathological anatomy of the skin, the genital organs, the ductless glands, the bones and joints, and of the nervous system, is not considered at all. This incompleteness detracts most seriously from the possible usefulness of a book put forth as a guide in laboratory and post-mortem work, and it would have been only fair to prospective purchasers if the limited scope of the work had been indicated on the title-page.

A separate consideration of fifteen and seventeen pages is given to the serous and mucous membranes respectively; this could well have been omitted, because the essential facts are stated also in connection with the various systems of organs. Figs. 236 and 237 are reproductions of Figs. 95 and 96; both sets illustrate anthracosis and chalicosis of the lungs, and remarks concerning these processes under the pathological anatomy of mucous membranes are repetitions of those made under general pathology. There is, therefore, room for condensation.

There are many statements in the chapters on Pathological Anatomy that are open to criticism. On page 412 it is stated that in hyaline degeneration of the myocardium the fibres may undergo segmentation and fragmentation, but it is not emphasized that dissociation often occurs independently of hyaline changes. In discussing arterio-sclerosis, or atheromatous arteritis, as the process is termed in this book, no mention is made of Thoma's generally recognized theory as to the pathogenesis of this important disease.

On page 472 occurs the following incomplete statement: "Although rare syphilitic and tubercular ulcers may be side by side, and differentiation of the gross lesion impossible, the finding of anatomic tubercles containing the bacillus affords the necessary evidence." Thrombosis in the pulmonary artery is referred to as " autochtonous embolism " (page 455).

On page 508 it is erroneously stated that the tubercle bacillus, no matter the route of invasion, always incites a broncho-pneumonia. The description of the anatomical forms of pulmonary tuberculosis is rather meagre.

In various places fibrinous exudate is referred to as plastic; this designation dates from the time when a species of spontaneous generation was regarded as possible in the " plastic material " exuded, and should, therefore, no longer be used with reference to fibrinous exudation.

On page 522 we read: " Unlike cancers, sarcomata, if situated in the distributions of the portal vein, rarely reach the lung, but, travelling by the bloodvessels, involve the liver."

On page 584 it is stated that sarcoma of the liver may be primary or secondary; that " the primary growths are exceedingly liable to be pigmented—melanotic." Now, the facts are, as is well known, that the liver is a favorite seat for the development of secondary melanosarcoma, while the occurrence of true primary melanosarcoma of the liver is exceedingly rare, if, indeed, it can be said that an authentic case exists.

In the remarks about suppurative nephritis there is no clear-cut distinction made between the embolic and ascending routes of infection. Exception may be made to the statement that cystic disease of the kidney (*sensu strictu*) in the adult is usually unilateral. The tumors of the kidney receive very little mention.

The language is sometimes involved and ambiguous. On page 594, when speaking of " medical " and " surgical " diseases of the kidney and their relation to the cortex and medulla respectively, the author says " the division is purely clinical, but has some foundation in that the lesions which actually manifest themselves are, to a certain extent at least, in the structures just indicated." On page 460 we read of the "bacteritic" factor. On page 578 it reads: "The pus of the amœbic abscess may be sterile and contain the amœba coli." On page 537 occurs the following statement: "Suppuration of the lymph-glands fails to occur in many infections, particularly in those in which the infecting organism does not possess the faculty of pus production." Again, on page 611 it says: "As a rule, but one kidney is involved, except in bilateral congenital cystic disease, when both organs may be implicated."

At the end of each chapter is a list of questions for the guidance of students; sometimes the questions are rather comprehensive, as, for instance (page 524), "What morbid conditions may be found in the lung?"

The original drawings are very good, as a rule. In Fig. 178 of actinomycosis the organism is explained as coming from bovine tuberculosis. In Figs. 198 and 199 of leprosy and syphilis-bacilli the bacilli are drawn as though from cover-slip preparations. The majority of the borrowed drawings are rather diagrammatic. The indices are quite complete.

L. H.

EPIDEMIC DIPHTHERIA, A RESEARCH ON THE ORIGIN AND SPREAD OF THE DISEASE FROM AN INTERNATIONAL STAND-POINT. By ARTHUR NEWSHOLME, M.D. Pp. 192. London: Swan Sonnenschein & Co., Limited, 1898.

DR. NEWSHOLME'S work is the result of a most careful and laborious study of the epidemics of diphtheria that have occurred in various cities and countries, and of the coincident, preceding, and succeeding climatic conditions that have been recorded. In handling statistics of the disease he has recognized such limitations of their value as are due to defects of registration, differences in nomenclature, and the fact that deaths alone cannot be an absolute index of prevalence; but with the material at hand he has worked with great care, conscientiousness, and skill. He dissents from the generally-accepted view that the origin and spread of diphtheria are favored by wet weather, and, in fact, shows that the great pandemics have all occurred during periods of unusual dryness, and draws attention to the fact that in tropical countries, where the conditions of excesive humidity and rainfall obtain, it is a rare disease. His main conclusions are two: 1. That diphtheria spreads from town to town and from country to country, the means of spread being almost certainly personal infection. 2. That certain climatic conditions are necessary for the development of diphtheria as an epidemic, and still more for its development on a pandemic scale. His observations on the relation between rainfall and ground-water and the rise of epidemic diphtheria lead him to the conviction that epidemics never originate after a series of years in which each year's rainfall is above the average amount, or in a wet year unless this follows after two or more immediately preceding dry years; that all epidemics of which accurate data are available have originated in dry years, and that the most extensive of them have occurred when there have been four or five consecutive dry years. In discussing the various phases his arguments are well sustained by numerous diagrams and tables, the collection and preparation of which must have entailed the expenditure of much time and trouble.

In view of the impossibility of controlling meteorological conditions, he lays especial stress on the importance of preventing personal infection during epidemic periods, and of improving the wholesomeness of the soil in districts in which the disease is endemic. C. H.

ATLAS OF LEGAL MEDICINE. By DR. E. VON HOFMANN. Authorized Translation from the German. Edited by FREDERICK PETERSON, M.D., assisted by ALOYSIUS O. J. KELLY, M.D. Philadelphia: W. B. Saunders, 1898.

THIS is a series of fifty-six colored plates and nearly two hundred illustrations in black, all original and prepared from recent cases or museum specimens, designed not to serve the purpose of a text-book of legal medicine, but as an assistance or supplement to such a work. The subjects cover such a wide range that it may be fairly stated that the entire field of medical jurisprudence is included. The colored plates are sometimes rather vivid, but always horribly realistic and, as specimens of color-printing, unsurpassed. As to the illustrations in black, which are reproductions from photographs, nothing could be finer, the minutest details being sharply brought out. Each illustration is accompanied by a description, and in many cases by discussion and inferences. The book is of particular value to medical examiners and coroners.

C. H.

TEXT-BOOK OF DISEASES OF THE KIDNEYS AND GENITO-URINARY ORGANS. By PROF. DR. PAUL FÜRBRINGER. Translated from the German, with annotations, by W. H. GILBERT, M.D. In two volumes. Vol. II London: H. K. Lewis, 1898.

TEXT-BOOKS and treatises devoted entirely to special genito-urinary surgery are far from uncommon at the present day. Indeed, genito-urinary surgery, as a special branch of general surgery, has taken such rapid strides in the past few years that the general surgeon and books on general surgery are no longer competent to deal as fully with the subject as its importance demands. The book now in our hands is, according to the title-page, the second volume of a work devoted to diseases of the kidneys and genito-urinary diseases, and deals especially with surgical conditions of the kidney and bladder, gonorrhœa, and functional genito-urinary ailments.

The name of the author is one familiar to all genito-urinary surgeons, and is sufficient of itself to command widespread attention to the work.

The text is closely written, and in some places the sentences are so long and involved that the meaning is consequently somewhat obscure. This is, in all probability, due to faulty translation, although, upon the whole, with these few exceptions, the translator's work has been admirably accomplished.

The first part of the book, fully one-third of the whole volume, is devoted to diseases of the kidney and ureters. As might be expected, in the discussion upon this subject pathological anatomy forms the most prominent feature; much more so, in fact, than in many a more pretentious work upon genito-urinary diseases. The whole subject of the surgical diseases of the kidney is treated very thoroughly, and is a most valuable contribution to the literature of this hitherto rather obscure field of surgical knowledge.

The article upon cystitis is, to our mind, the most unsatisfactory in the book, the reader finding himself at once involved in a hopeless tangle of varieties and classifications of cystitis, together with a most complex pathological anatomy of the various forms of the disease enumerated. We are pleased to note, however, the warning which the author, in discussing the treatment of this affection, sounds against reckless and indiscriminate irrigation of the bladder in cases of chronic cystitis.

In the section upon gonorrhœa in the male, which, by the way, is the ablest in the book, we are surprised to find that the author declines to admit of the division of urethritis into anterior and posterior. This localization of gonorrhœa is, to our mind, the most important factor in the successful treatment of the disease, and we certainly fail to find any sufficient argument advanced by the author for his refusal to accept this division of the urethra.

In discussing the treatment of gonorrhœa the statement is made that "the gonococcal theory has no influence on the therapeutic results obtained in gonorrhœa," a statement with which, we think, most genito-urinary surgeons with an extensive experience in the treatment of the disease will be heartily in accord.

The final sections of the volume are devoted to functional genito-urinary ailments, including impotence and sterility.

The work, as a whole, deserves careful study at the hands of genito-urinary surgeons, to whom it will prove to be of considerable value. Several new lines of thought are suggested which, to the specialist, should possess some interest.
H. M. C.

THE PURIFICATION OF PUBLIC WATER-SUPPLIES. By JOHN W. HILL. Pp. 304. New York: D. Van Nostrand Company, 1898.

THIS work, according to the preface, is intended to present: 1. The fact and causes of pollution of sources of public water-supply. 2. The effect of this pollution on the typhoid-fever rates of our larger cities. 3. To illustrate, by a few examples, how typhoid death-rates have been reduced by the introduction of water from purer natural sources and by filtration of polluted waters.

The author demonstrates a thorough comprehension of the vast importance of his subject, and presents his case with unusual ability. Every subject connected with public water-supplies is fully and freely discussed. He has collected and condensed within reasonable limits a very large amount of material of the greatest value to sanitarians, water analysts, and officials intrusted with the responsibilities of the conservation of the public health, and his book deserves the widest circulation not alone among these, but also among the intelligent laity.
C. H.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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AND

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Œsophageal Stenosis Following Scarlet Fever and Diphtheria.—FRANZ EHRLICH (*Berliner klin. Wochen.*, October 17, 1898, S. 927) reports a case of stricture of the œsophagus, with an attack of scarlet fever and diphtheria as the only attributable cause.

A five-year-old boy had had scarlet fever and diphtheria, with severe ulceration in the throat, when three years old. There was no other history to account for the subsequent stenosis of the œsophagus. No history of syphilis or of swallowing caustic substances existed. The first trouble in swallowing came on shortly after the attack of scarlet fever and diphtheria, and progressed until all attempts to swallow solid food were followed by almost immediate vomiting. The child had become much emaciated. The passage of a sound revealed an impassable stricture between eighteen and twenty centimetres from the incisor teeth. As sounds could not be passed through the mouth, and as the age of the child rendered the use of the œsophagoscope inadvisable, gastrototomy was performed, and retrograde dilatation was attempted, but was only partially successful. The œsophagoscope was then introduced through the stomach, and a tight constriction was seen. An attempt was made to dilate the stenosis by having the child swallow silver balls after König's method, but without success. Then a spiral sound was introduced, causing some dilatation, and an attempt was made to introduce a permanent tube through the stenosis, but this could not be done, and after a few larger sounds had been passed a laminaria tent was introduced. This seemed in part successful, and a larger one was introduced, but in attempting to pull it out the thread broke. Attempts to drive the tent out by olive bougies were not successful, and it was finally dislodged by introducing a stiff bougie through the œsophagoscope, and was passed by the anus a few days later. Water-pressure was afterward used, and increased the diameter of the stricture to a slight degree. Subsequent introduction of sounds brought the diameter up to twelve millimetres—nearly the same as the normal part of the œsophagus. The gastric fistula was closed, and the general condition of the boy when the case was reported was extremely good.

Eiselberg has also recently reported a similar case. The two cases appear to be unique in their etiology.

Clinical Examinations of the Blood-platelets.—DETERMANN (*Deutsche Archiv für klinische Medicin*, 1898, Band lxi., Heft 4, S. 365) has made a careful study of the blood-platelets, with special reference to the origin of these interesting bodies. The value of his article is increased by a very complete bibliography on the subject.

The physical and morphological characteristics of the platelets in ordinary fresh specimens of blood, in specimens diluted with some preserving fluid, and in stained preparations are first described. Determann regards Bizzozero's fluid, consisting of a 0.9 per cent. solution of sodium chloride, to which concentrated aqueous solution of methyl-violet in the proportion of one drop of the latter to 10 c.c. of the former is added, the most satisfactory preserving fluid for studying and counting the platelets in the fresh blood.

The author's device for determining the number of platelets is an interesting and apparently satisfactory one. To prevent the natural tendency of the platelets to run together, the finger is pricked, a drop of the preserving fluid placed on the incision, and the blood allowed to flow directly into it. A cover-glass of a Thoma-Zeiss counter is then touched to a drop of diluted blood and the two intimately mixed on the cover. The cover-glass, with the proper-sized drop of diluted blood, is then placed in position on a Thoma-Zeiss counting-cell and the platelets and red blood-corpuscles counted over a certain area. In this way the ratio of platelets to reds is readily determined, and, knowing the number of red cells from a separate count, the number of platelets per cubic millimetre can easily be reckoned.

Determann has made counts in 110 individuals, of whom 25 were healthy persons. In the healthy individuals the ratio of platelets to red corpuscles ranged between 1 : 18 and 1 : 30, with an average of 1 : 22. He refers to the variations to which the number of platelets is subject in healthy individuals, and then deals at considerable length with the number of platelets as found in various diseases. In some chronic diseases the platelets are enormously increased, the proportion to reds often reaching as high as 1 : 1. In two cases, one of arthritis deformans and the other of myelitis, the platelets far exceeded the reds in number, the ratio being 2 : 1 and 4 : 1, respectively.

The various views concerning the origin of the platelets are then discussed, and from his own personal work he is led to support Arnold's observations that the platelets are derived from the red blood-corpuscles. For the purpose of studying the red cells and watching changes in them, under circumstances which varied as little as possible from their physical surroundings in the circulating blood, Determann employed small glass tubes, the ends of which were drawn out to fine points and sealed. To fill the glass tubes, one fine end is placed in the flowing drop of blood and the tip broken off with small scissors. The blood then flows into what is practically a vacuum. When the desired amount is obtained this end is again sealed by heating, and the blood subsequently obtained from the other end as desired. Several tubes thus prepared are kept in a thermostat at 37° C. and examined microscopically after twenty-four hours or after several days or weeks. The specimens for microscopic examination are made according to Arnold's method, by impregnating very thin sections of elder-pith with the blood, applying a cover-slip, and then sealing the specimen with vaseline. In this way the air is excluded, drying is prevented, and the specimen can be studied for a long time.

In preparations thus made Determann finds that after twenty-four hours the red blood-corpuscles show definite buds on their surface, which at first are attached to the cell by protoplasmic processes and contain hæmoglobin. Later, the buds become separated from the cell, lose their hæmoglobin, and become indistinguishable from the ordinary blood-platelets. In preparations of normal blood examined after forty-eight hours, seventy-two hours, and longer, these changes were more marked, and the separated, decolorized, granular portions more numerous.

The blood in many cases of anæmia, including chlorosis, was examined in a similar way, and the budding process was much more marked than in normal blood.

Determann, as a result of his observations, is forced to agree with the view of Arnold, that the blood-platelets are, for the most part, not preformed elements, but derivatives of the red blood-corpuscles. He believes that the number of platelets in the blood is an index of the power of resistance of the red blood-cells at any particular time. He also thinks that the platelets are of prognostic importance in that they are an expression of the vitality of the red blood-corpuscles.

Tabes Dorsalis and Syphilis.—GUTTMANN (*Ztschr. f. klin. Med.*, Band xxxv., S. 242) refers at considerable length to the conflicting views held regarding the part played by syphilis in the etiology of tabes dorsalis. Erb and his followers, as is well known, hold that syphilis is an extremely important factor in its causation. On the other hand, Leyden and his school think that the part played by lues in the etiology is very much exaggerated. Both of these clinicians reiterated their widely different views at the Twelfth International Congress, held in Moscow in 1897. Leyden claims that the luetic theory is based upon an incorrect manipulation of the statistics.

Guttmann's work is published from Leyden's clinic, and naturally supports Leyden's theory, that lues plays an unimportant rôle in the etiology of tabes. The statistics include cases occurring in all spheres of life and in both sexes, females not being excluded, as has been the case in statistics supporting Erb's theory. He first reports 111 cases, all of which occurred either in Leyden's clinic or in the private practices of Prof. Leyden and Dr. Paul Jacob. In these 111 cases a syphilitic history was definitely present in 36, absent in 69, and doubtful in 6. Dividing the doubtful cases equally between the cases of tabes with and without a history of lues, his statistics show 39 cases, or 35.1 per cent., with lues, and 72 cases, or 64.9 per cent., without lues.

In addition, Guttmann has statistics, from one of the most reliable insurance companies, of 25 cases in which tabes had been the cause of death. In not a single instance was a syphilitic history obtained when the patients secured their policies. Guttmann thus has a total of 136 cases of tabes, in 39 of which, or 28.6 per cent., syphilis existed, whereas in 97 cases, or 71.4 per cent., no luetic history was obtained. Guttmann proceeds to show that the researches in the anatomy and pathology of the disease are just as conclusive against the syphilitic theory.

Senator, on the whole, agrees with the Leyden school, but thinks that syphilis may be a predisposing factor in the causation of tabes just as it is in scrofula, rickets, amyloid degeneration, and contracted kidney.

Leyden and Senator claim that an anti-syphilitic method of treatment does not give better results than many other procedures, and that it often even does harm. The Leyden school recommends highly the hygienic-dietetic treatment as being the best. Systematic massage, friction, electricity, and baths, with suitable diet, afford the best results. It is claimed that the ataxia can be appreciably diminished by the proper carrying out of "compensatory exercises."

Diplococcus Peritonitis in Children.—HAGENBACH-BURCKHARDT (*Correspondenz-blatt für Schweizer Aerzte*, October 1, 1898, xxviii. Jahrg.) reports two cases of primary peritonitis in children due to the pneumococcus.

He refers to the work of Boulay and Bruns, who produced peritonitis experimentally on guinea-pigs by injecting Fraenkel's pneumococcus into the peritoneal cavity. In all animals experimented upon the pneumococcus was obtained in cultures from the peritoneal exudate, spleen, and heart's blood.

Comby states that pneumococcus peritonitis in children may be secondary to pneumonia or to a localization of the pneumococcus elsewhere. On the other hand, the pneumococcus may excite a primary peritonitis. The onset is sudden, with abdominal pain, vomiting, and fever. The disease runs a course similar to that of pneumonia, the symptoms subsiding after they have persisted for about eight days. The child at first seems to have completely recovered, but it is observed that the abdomen remains swollen, and eventually a purulent exudate is discovered. According to Comby, these cases heal spontaneously by perforation, either at the umbilicus or into the bladder. He has collected twenty-two cases in children, whose ages ranged between three and twelve years.

Bruns states that the disease is commoner in female than in male children, eleven of his fourteen cases being in girls. He refers to the probability of infection occurring through the generative tract. This view is supported by the frequency with which the infection is localized in the pelvis or iliac fossa. Of the cases collected by Bruns, eleven recovered and three terminated fatally. Laparotomy was performed in ten cases.

Hagenbach-Burckhardt's two cases were also in girls, aged two and six years respectively. The onset in both cases was sudden and acute, with abdominal pain, tenderness, and distention, fever and general disturbance of the health. There had been no previous lung involvement. The cases were then believed to be either typhlitis or tuberculous peritonitis; the true nature of the disease being revealed by the cultures taken at the time of operation. The bacteriological examination showed that the disease was due to the pneumococcus. In one of the cases several metastatic abscesses developed in various parts of the body, the cultures from these showing the pneumococcus. In both patients the exudate was encysted and localized in the lower and anterior abdominal region. Both children made good recoveries after operation. Hagenbach-Burckhardt states that these cases do well after operation, and that a favorable prognosis may be given when cultures show pneumococci in a peritoneal exudate.

Typhoid Orchitis.—In the *Lancet* (October 29, 1898, p. 1048) reference is made to an instance of this rare complication, reported in the *Journal des Praticiens* for September 3d, by Dr. Breton. During convalescence from typhoid fever a youth, aged seventeen years, was seized with pain in the right testicle, which was soon followed by suppuration. When seen two months later there was an ulceration of the skin of the scrotum of the size of a franc-piece and a small fistulous opening surrounded by a reddened zone, the whole having the appearance of a tuberculous lesion. The testicle was involved, but the epididymis was not invaded. There was swelling of the lymph glands in the corresponding groin. Tuberculin injection gave no reaction. The whole of the suppurating area was removed; a bacteriological examination showed the presence of a bacillus with the characters of the typhoid bacillus, but the writer was not able to differentiate it absolutely from the colon bacillus. The wound healed in eight days.

[Orchitis appears to be an exceedingly rare event in typhoid fever. The first instance in between 800 and 900 cases at the Johns Hopkins Hospital occurred last summer. Dr. Davis, of the Military Hospital at Fort Meyer, Va., informs me that there have been three cases of orchitis among the 1100 to 1200 cases of typhoid fever treated there this year.—W. O.]

SURGERY.

UNDER THE CHARGE OF

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Two Cases of Oöphorectomy for Inoperable Breast Cancer.—Cheyne (*British Medical Journal*, May 7, 1898) reports two cases in which he removed the tubes and ovaries in accord with Beaston's method of treatment of inoperable cancer of the breast.

In one case he could not say that there was the slightest beneficial result from the oöphorectomy. In the other case, however, the operation had undoubtedly a marked effect on the growth of the cancer and led to very distinct breaking down or absorption of portions of the growth. The interesting point, however, is that the effect of the oöphorectomy gradually passed off, so that at the end of about six months the tumor began to grow again, and has since made marked strides. The result of these two cases, which were typical instances in young women whose ovaries were still active, and in which, therefore, their removal, if it is ever advantageous, should have produced the most marked results, is extremely discouraging, and he doubts if it is worth while going on with the procedure. Nevertheless, as a scientific fact it is clear, especially taken in conjunction with Dr. Beaston's first case and one reported by Mr. Boyd, that there is a distinct connection not only between the normal epithelium of the breasts and the ovaries, but also between cancerous epithelium of the breasts and the ovaries. But, unfortunately, in all the cases it appears that the effect of the removal of the ovarian influence is only more or less transitory at best, while in many cases no effect is produced.

If the operation were to be performed again, he thinks it would be well, either at the same time or, possibly better, later to remove as much of the noticeable disease as possible. This has already been suggested, and in one case the ovaries, breast, and glands were removed at the same time; sufficient time has not elapsed in this case for the operator to form an opinion of the result. If the result of removal of the ovarian influence is to lead to atrophy of the epithelium originating from the mamma, it would clearly be of advantage to have as little of the epithelium present as possible.

It is quite probable that if too much epithelium is present, the removal of the ovarian influence might not produce sufficient alteration in the body to overcome all disease.

A Case of Plastic Operation for Burns.—MACLAREN (*British Medical Journal*, June 4, 1898) reports an unusually interesting case in which the granulating surface, after the removal of the sloughs, extended round the whole right arm and forearm from the middle of the deltoid to near the wrist; it involved the right side of the chest from the axillary line above to the margin of the ribs below, and from within three inches of the sternum in front to the same distance from the spine behind; the entire axilla was denuded and raw. The whole thickness of the skin appeared to have been destroyed over a considerable part of this area; the burning was greatest in the neighborhood of the elbow-joint, and the tip of the olecranon was slightly bared.

The advisability of amputation to relieve the child's system from so great a drain from so large a suppurating surface was considered, but it was decided to make the attempt to save the arm. To diminish the granulating area and promote healing, the arm was bound to the side. Quick adhesion occurred, binding the arm to the thorax, thus diminishing the raw surface by a third.

In nine months complete healing had occurred. Two skin-flaps were then dissected from the thorax, one before and one behind, where the skin was uninjured. They were left attached at both ends, and separated from the tissues underneath with glass slides for a fortnight. The arm was then separated from the side right up to the axilla; each flap was cut across at the end farthest from the axilla; a bed was made for each in the armpit; they were turned and sutured together, so as to form a broad tape of healthy skin at the fold of the axilla. The arm had been so cut from the side that the flaps united around it and covered the denuded area. The raw surface produced on the trunk was covered by making incisions in the sound tissues about the cicatrix, which permitted it to be run nearly together. Two months sufficed to complete the healing, except at the elbow. An inch and a half of the humerus was removed subperiosteally at the junction of the middle and lower thirds to relieve the tension on the hide-bound tissues due to growth and to save removing so much bone when the elbow-joint was excised, which was the next step.

The result was that the movements of the shoulder-joint were nearly normal. The elbow admits of almost complete flexion and extension; rotation of the forearm exists only to a very slight degree; the wrist has always been normal: the arm, of course, has not much power, but it is gaining in that respect and also in freedom of movement. The cicatricial skin is gradually approaching nearer to the natural state; it is becoming less glazed and more pliable.

Bullets Detected in the Brain by the Röntgen Rays.—Von Bergman (*Berliner klin. Wochenschrift*, 1898, No. 18) reports two cases of the detection by Röntgen rays of bullets within the brain substance. Skiagraphs were taken in both the anterior and lateral planes, but no attempt was made to locate either of the bullets absolutely. The author studied the symptomatology of the cases and the supposed location of the injury, as shown from our knowledge of cerebral localization, and found that many of the symptoms produced were the result of the traumatism which was caused by the passage of the bullet through various areas and tracts in the brain, and was not due entirely to its final location. The author believes the Röntgen ray method to be very valuable in determining the locality of these foreign bodies and in deciding on the advisability of removal. If they lie in areas in which their encysting would lead to very little injury, and where there would be little danger of further trouble arising from them, he advises that they be left alone, and believes that attempts at removal would be more injurious than helpful. Most of the symptoms complained of are due to the traumatism inflicted on structures other than those surrounding the bullet, and would not be relieved by its removal. In the two cases reported no attempt was made at removal, as the location showed the tissues to be quiescent where the bullet lay.

The Diagnosis of Calculous Nephritis by Means of the Röntgen Ray.—It has heretofore been possible to detect only certain forms of calculi in the kidney, and the diagnosis has therefore been only positive in its character. Leonard (*The Philadelphia Medical Journal*, August 20, 1898) shows that recent improvements in technic and apparatus make it possible to repeat exposures under identical conditions and to produce a Röntgen ray capable not only of penetrating the more opaque portions of the body, but also of differentiating between the less opaque structures.

The absolute conditions essential to the detection of calculi have been determined and proved by repeated clinical evidence, so that it is certain that under these known conditions any renal calculus must be detected, and that the absence of the shadow of a calculus in a negative showing certain definite details is conclusive evidence of the non-existence of all calculi in that region.

This is the evidence essential to a complete diagnosis that has been wanting. The value of such evidence in relation to renal disease is especially great in differentiating between the many conditions that simulate calculous nephritis. There are many cases of calculous nephritis in which the classical symptoms of stone are nearly all wanting, either from some peculiarity in the individual and the development of the calculus, or because it is so small as to produce few or only occasional symptoms.

The cases that go undiagnosticated to the post-mortem table are usually of this character, the gradual disintegration and destruction of the kidney or a sudden fatal attack of anuria terminating the disease, while, practically, all cases of renal lithiasis in their incipient stage, when diagnosis and operation are most valuable, may be considered in this group.

In three cases which have come under the author's observation the additional data furnished by the skiagraphs have been of great value in the subsequent operation, even in cases where it was known that stone existed previously. The author holds that all cases of suspected renal calculus should be submitted to this method of diagnosis before so serious a diagnostic measure as exploratory nephrotomy is employed; and, if for no other reason, it should always be employed to determine whether only one or both kidneys are involved, for the very nature of renal lithiasis makes it possible that a similar deposit has occurred in the other kidney.

Forcible Straightening of the Spine in Pott's Disease.—In reporting a case in which he has employed the procedure recently reintroduced by Calot, FREEMAN (*Annals of Surgery*, April, 1898) gives the following as the theoretical advantages claimed for this method: (1) Immediate, complete, or partial correction of deformity; (2) removal of pressure and irritation from the cord, resulting in some cases in relief from neuralgic and paralytic symptoms; (3) separation of the diseased surfaces of bone, thus avoiding pressure and irritation, which are supposed to favor continuance and spread of the disease; (4) gain in length of the spine; (5) avoidance of malformation of the chest-walls and injurious alteration of the position of organs.

The disadvantages which have been claimed are (1) production of a large cavity which may not fill up with sufficiently firm tissue; (2) non-formation of supporting masses of new bone and consequent weakness of the spine and recurrence of deformity; (3) rupture of tubercular material into the mediastinum; (4) increase of the disease by local injury, separation of fragments of bone, etc.; (5) production of tubercular meningitis or general tuberculosis; (6) injury to the cord or its membranes; (7) production of abscesses.

Certain of these objections undoubtedly have weight, while others are more or less imaginary or at least are not greater than are met with in the correction of deformities due to tuberculosis elsewhere in the body. Considering the number of cases already reported and the favorable results obtained, we are certainly justified in operating upon reasonably recent cases, with not too great deformity, where but moderate force is required, and especially upon those with neuralgic or paralytic symptoms which do not tend toward improvement. The straightening process is, perhaps, more liable to relieve anterior pressure upon the cord than would a laminectomy. On the other hand, we must recognize that the method is yet in its experimental stage, and that we cannot speak with certainty as to the durability of its immediate achievements.

The Serum-therapy in Infections by Pyogenic Micro-organisms and in Erysipelas.—The value of serum-treatments in infections by pyogenic micro-organisms and in erysipelas have been carefully studied in an exhaustive series of experiments by PARASCANDOLO (*Wiener klin. Wochenschrift*, 1897, Nos. 38 and 39), from which he derives the following conclusions:

1. That he was the first to establish on a solid basis the theory of immunization of animals from infection by pyogenic cocci and those of erysipelas, and to produce a potent serum.

2. He also provided examples of a new variety of the streptococcus pyogenes and of erysipelas.

3. That the best culture medium for these bacteria is a peptonized and sweetened meat-bouillon.

4. That he has shown that the best method of increasing the virulence of pyogenic and erysipelas cocci is the preserving of the culture on a 2 per cent. sweetened and peptonized bouillon, and that this method is superior to all others.

5. That the highest grade of virulence which can be produced in pyogenic and erysipelas cocci is $\frac{1}{1000000}$ cm. which is capable of killing a guinea-pig of 400 grammes weight in forty-eight hours. A higher grade of virulence cannot be produced with our present means.

6. The best method of immunizing animals is by the use of toxins and not cultures of virulent bacteria.

7. That the best protective serum is that derived from animals immunized in this manner.

Total Extirpation of the Bladder for Neoplasms.—TUFFIER and DUJARIER (*Rev. de Chir.*, April, 1898), in discussing the operative procedures necessary in growths of the bladder, point out the following facts:

1. That the conditions differ considerably, according to whether the operation is primary or secondary to a cystotomy, with persistence of a urinary fistula. In the latter case the dissection is more difficult, and the danger from septic infection is greater.

2. The preferable incision is an inverted ⊥, the perpendicular portion separating the recti, while the transverse extends from one inguinal ring to the other.

3. The removal of the bladder is not very difficult, except when it is covered by peritoneum; here the dissection should be carried out cautiously,

especially at the summit of the bladder. Resection of the peritoneum is sometimes necessary, and should be done in preference to leaving a portion of the neoplasm. The further removal is easy, especially if the bladder is first released by dissections on its two lateral aspects. During all the dissection it must be drawn outward with forceps, as in a vaginal hysterectomy; thus all the dissection is done with the parts in plain view. If the bladder has already been opened a finger placed within facilitates the dissection.

4. The resection of the ureters can be made before or after they have been catheterized; the authors have found it just as easy to catheterize them after as before. The ureters are in close approximation to the inferior vascular pedicle of the bladder, and nothing is easier than to take all in a curved hæmostat and cut below it. The vessels are tied after the removal of the bladder, and the ureters catheterized.

5. The section of the neck of the bladder is also made after placing a hæmostatic clamp, as the venous bleeding would be profuse, but can readily be controlled after the bladder has been removed. After catching the larger vessels the general oozing may be stopped by the thermo-cautery, and at the same time the mucous lining of the urethra should be cauterized, thus preventing infection from that source.

6. The ureters are then catheterized, the catheters coming out of the abdominal wound.

In the female the authors prefer the operation of Pawlick, in which the vagina is used as a bladder after the removal of the ovaries to suppress menstruation.

In the male the transplantation of the ureters into the sigmoid flexure is the preferable operation. The patient has perfect control, and is obliged to evacuate the rectum only from three to eight times a day. No erythema of the anal region or injury of the kidneys has been noted. The ureter may be fixed with the buttons of Boari or Chalot, or the use of sutures after the technique of Krynski may be preferred.

A Method of Exposing and Operating on the Kidney Without Division of Muscles, Vessels, or Nerves.—The following is the description given by Mayo Robson (*The Lancet*, May 14, 1898) of a new method of incision in operations on the kidney:

"The incision, beginning to the inner side of the anterior-superior spine of the ilium, is carried backward obliquely toward the tip of the last rib. The fibres of the external oblique and its aponeurosis are then split and retracted, exposing the internal oblique muscle, the muscular fasciculi of which are split in a line between the ninth costal cartilage and the posterior superior spine of the ilium, in which position they are longer than in front or behind that line. When the fingers are pushed through the internal oblique to split it, the fibres of the transversalis are pierced and can be retracted along the oblique muscle. A diamond-shaped space is thus formed, at the bottom of which is seen the transversalis fascia, which is then incised, exposing the perirenal fat, and on pushing the fingers through this the kidney is easily reached in whatever position it may lie. If needful, the whole hand may be introduced into the perirenal space, and the kidney can be grasped and freely manipulated, the retractors for the moment being withdrawn. If the vessels are moderately long, and in all cases of movable kidney, the organ may be brought through the wound and explored by incision or by needling, or it may be examined by the selenium screen and the Röntgen rays. Should a calculus be found it can be extracted and the wound sutured before the organ is returned.

"The advantages of this method of exploring the kidney are obvious: 1. There is no division of the muscles, and therefore no weakening of the abdominal wall, immediate or remote. 2. No vessels are divided, thus not only saving time, but rendering healing *per primam* more likely. 3. No nerves are severed, and therefore paralysis of the rectus and other muscles is avoided. 4. The operation is done with the patient lying on the back, to the great convenience of the anæsthetist, the operator, and his assistants, and to the manifest advantage of the patient, who is saved much unnecessary disturbance. 5. The great saving of time, as well as the diminution of hemorrhage, means lessening of shock, thus rendering the operation feasible when otherwise it might be questionable. 6. It is an important fact that diagnosis in kidney cases, especially in renal calculus, is by no means perfect, and if it can be proved that an exploration of the kidney can be done quickly, with little or no danger, and without subsequent weakness being left, the physician will be less loath to permit the surgeon to perform an exploratory operation after all other means have been fruitlessly tried. 7. Lastly, after such an operation convalescence is materially shortened, as the patient may be safely allowed to be up at the end of the second week or even earlier, since there is no fear of the wound giving way."

The author, in addition, makes the following remarks: "Whenever I can, when operating away from the middle line of the abdomen, I make use of the principle of splitting instead of dividing muscles; for instance, in gastrostomy, in inguinal colotomy, in typhlotomy, sometimes in cholecystotomy, and nearly always in removal of the vermiform appendix. I would also point out that if it be found necessary to extend the opening—for instance, in case of operation on the ureter—deeply into the pelvis, it is easily accomplished by departing slightly from the principle here advocated and dividing the deep plane of fibres and further splitting the external oblique toward Poupart's ligament. The internal oblique will then require suturing to bring together the divided edges. In this way the ureter, even to its entrance into the bladder, may be fully exposed to sight as well as touch."

THERAPEUTICS.

UNDER THE CHARGE OF

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The Soluble Metals.—DR. OSCAR WERLER presents an able plea for the use of soluble metallic silver in the treatment of septic wound-infection (blood-poisoning). Following Credé, he believes that a metallic silver in fluid condition, changing in the body into the antiseptic salts, is the only available form. This has been obtained as a colloidal substance, almost entirely soluble in water and albuminous fluids, which apparently hinders the development of or destroys certain pathogenic germs when introduced into the organism, and permeating the organisms by means of such a substance, which of itself can do no harm, it is of obvious advantage to the physician, practically giving him the same certainty which has hitherto been enjoyed by the surgeon, and even extending the field of the latter. As an example of acute sepsis, an instance of an acute diffuse septic phlegmon of the dorsum of the hand following infection of the index-finger is cited. Here incipient universal septicæmia is evident from perusal of the report. Five grains of soluble silver ointment were rubbed into the skin of the healthy side for twenty minutes each day. Externally, cold applications of 1 to 4000 solution of silver citrate were applied. Immediate improvement in the general condition followed, so that it could be said that the progress of the disease centripetally was checked and the septic process remained localized. Four days later the general condition was satisfactory, and local healing was already established. A chronic septic infection resulting from an erysipelatiform phlegmon, caused by fissuring chronic eczema of the foot, received double the above amount of soluble silver ointment, which was daily rubbed into the breast and back. In ten days the local disability and general symptoms had entirely disappeared. The chronic septic infection following multiple chronic furunculosis next attracted attention. Here, also, the silver citrate solution was used locally, while forty-five grains of the soluble silver ointment were applied by inunction. In this instance two weeks sufficed to bring the disease under subjection. He concludes: 1. That in this, with an early diagnosis and in the absence of severe secondary affections, we have a successful internal remedy. 2. This is satisfactory in both acute and chronic sepsis and in furunculosis. 3. The most energetic action follows the use of a soluble silver ointment by the method of inunction, which carries the remedy immediately into the circulation, and there, by the development of bactericidal silver salts, there results complete antisepsis and disinfection of the entire organism. The ointment employed contains 15 per cent. of soluble silver.—*Deutsche medicinische Wochenschrift*, 1898, No. 40, S. 73 (*Beilage*).

The success obtained with silver has led to the production of mercury in colloidal form, which is also soluble. The properties which a chemically pure metal, soluble in water, present are of great interest from the stand-point of pharmacology. The gentle physiological action, free from irritation, permitting accurate dosage and an avoidance of poisonous by-symptoms, and which allows a rapid and certain absorption, warrants the use of allotropic colloidal mercury. This is a substance of metallic lustre, dark-brown in color, permanent, and soluble in water. It may be employed as: 1. The ointment for inunction. 2. A 1 or 2 per cent. dark-brown, aqueous solution for subcutaneous injection. 3. A pill containing one-sixth of a grain. 4. Tablets of fifteen grains for preparation of solutions and for baths in diseases of children. 5. A plaster for local application (enlarged glands, ulcerations). The strength of the ointment most generally useful is 10 per cent.—*Berliner klinische Wochenschrift*, 1898, No. 42, S. 937.

Sodium Chlorate in the Treatment of Hyperchlorhydria.—Dr. Maurice Soupault employs this drug in daily amounts not to exceed two drachms. It is well known that large doses are toxic, producing albuminuria, methæmoglobinuria, and even bulbar symptoms. But this amount can be continued for months with safety, provided it is not given to persons suffering from renal lesions. It should be administered twice or thrice daily in a warm solution, as far as possible from meals, so that it may act directly upon the gastric mucous membrane. Generally speaking, all dyspeptics are benefited. In cancer the pain, nausea, and vomiting disappear, the patient eats more and with less disgust, and hemorrhage ceases. The general condition improves, although there is no reduction in the size of he tumor. Especially in the hypersthenic dyspepsias (hyperchlorhydria) and in those conditions which depend upon it (gastrosucchorrhœa and gastric ulcer) are the beneficial results more apparent. Those patients very slightly benefited by alkalies or lavage show a striking and permanent improvement after a few days' treatment. In the gastralgias so frequent with these conditions the results are brilliant. On the other hand, in the asthenic dyspepsias (nervous or nervo-motor of Mathieu) the result is doubtful or unsatisfactory. The action of the remedy probably lies in the diminution of the inflammatory phenomena, the catarrh and congestion of the mucous membrane, and possibly in healing the erosions and superficial ulcerations; the result is the disappearance of the hyperæsthesia and exaggerated excitability of the stomach. Chemical investigations show that the acidity is but slightly influenced, and that the chlorine content is unchanged. However, the gastric secretion is diminished in quantity and even gastrosucchorrhœa ceases. —*Les Nouveaux Remèdes*, 1898, No. 18, p. 409.

The Therapeutic Uses of the Suprarenal Glands.—Dr. W. H. Bates states that it is essential to remember that the active principle of the gland is incompatible with preservatives, and that it is weakened by heat; consequently it must be freshly prepared. Ten grains of the dried gland should be dissolved in two drachms of water and the solution filtered. The aqueous extract is the most powerful astringent known. A drop of the 1 per cent. (above) solution instilled into the eye whitens the conjunctiva of the globe and lids in from forty seconds to two minutes. It has no anæsthetic or antiseptic properties. For operations upon the eye it will relieve congestion so that cocaine-anæsthesia can be instituted. In various inflammatory conditions its use is indicated. Stricture of the nasal duct when caused by inflammation is relieved, and other strictures may be benefited by it. In diseases of the skin, even when it is unbroken, local anæmia can be produced, as in the inflamed skin of a burn, an eczematous patch, intertrigo, and it has been recommended to prevent the pitting of smallpox. In one instance of pernicious anæmia it produced a marked increase in the number of red blood-corpuscles. Since this substance has been demonstrated to be a tonic to the heart muscles, and blood tension is enormously increased by its subcutaneous use, its employment is suggested in cardiac disease. The hypodermatic injections may give rise to local pain; the use of it *per os* is somewhat uncertain. In one instance of exophthalmic goitre there was decided improvement in the action of the heart and in the general muscular strength. The goitre almost entirely disappeared, the tremor was not very marked, and there was considerable gain in strength. The remedy is a pure astringent in all inflammations, and a hæmostatic and a tonic to all muscle fibres, especially to those of the heart. It should be administered as an aqueous extract, a few drops being placed on the tongue.—*Medical Record*, 1898, vol. liv. p. 516.

The Treatment of [So-called] Bronchial Asthma.—Dr. Carl von Noorden strongly recommends the use of atropine. Commencing with the daily amount of one one-hundred and twentieth of a grain *per os*, the dose is increased by this amount every two or three days until the daily dose of one-sixteenth of a grain is reached. Then the amount is gradually diminished, the duration of the treatment averaging four to six weeks. This should be repeated every six months, but throughout less time and with smaller doses. These doses, beyond giving rise to some dryness of the throat and disturbance of accommodation, do not cause unpleasant symptoms as regards the heart save that the pulse is slightly more frequent.—*Therapeutische Monatshefte*, 1898, Heft 10, S. 539.

The Treatment of Lobar Pneumonia by Creosote Clysters.—Dr. E. Schoull cleans the bowels by enema and then administers twenty to forty drops of this in a clyster, twice daily. He believes that in this way either the pneumococcus is destroyed or its virulence considerably diminished. The disappearance of the fever and other general symptoms, while the physical signs persist, demonstrates that the gravity of the disease depends upon the toxins secreted by the microbe. The lesion itself develops in an aseptic manner without seriously disturbing health. These injections, indeed, regulate the disease.—*Bulletin Général de Thérapeutique*, 1898, t. cxxxvi. p. 133.

Treatment of Laryngeal Tuberculosis.—Dr. Walter F. Chappell reports upon nineteen patients treated under favorable climatic and systemic conditions. The various remedies in ordinary use for local treatment—creosote, lactic acid, ichthyol, iodoform, silver nitrate—were employed according to especial indications. Of laryngeal ulcerations, eight healed; two improved; two only were not improved. Seven laryngeal thickenings improved. In several instances the voice returned to its normal tone, and laryngeal cough and irritation entirely subsided. Relief of pain was marked. Every instance of laryngeal improvement was accompanied by pulmonary improvement, and the general condition was bettered. If special attention is paid to the upper respiratory tract in every tuberculous patient the frequency of laryngeal tuberculosis will be diminished.—*New York Medical Journal*, 1898, vol. lxviii. p. 368.

Pure Essence of Melaleuca Viridiflora.—Dr. Dubousquet de Laborderie has experimented with this substance for several months. It is obtained by distillation of the fresh leaves, and is also known as gomenol and essence of niaoull. It occurs as a slightly oily liquid of the specific gravity 0.922, neutral in reaction, of an amber color, a pleasant and aromatic odor intermediate between camphor and menthol, and a sharp taste, leaving a cooling sensation like menthol or peppermint. It is insoluble in water and glycerin, but soluble in oils, alcohol, ether, benzine, and petroleum. Chemically, it consists of: (1) aldehydes; (2) a turpentine carbon ($C_{20}H_{16}$); (3) most important of all, eucalyptol ($C_{20}H_{18}O_2$); (4) a terpinal ($C_{20}H_{18}O_2$; (5) polymers of $C_{10}H_{16}$ and resinous products, and (6) a sulphur compound in traces. Its advantage over similar essences of cajeput and eucalyptus lies in the very small quantity of aldehydes, which are always poisonous, which it contains. Besides, it is the only essence possessing a citrene. It contains a large proportion of the most important body, eucalyptol (66 per cent.), and is a natural terpinol. Experiments have been made in (1) respiratory diseases, notably pulmonary tuberculosis; (2) diseases of the kidney, bladder, and urethra; (3) painful affections, rheumatic and neuralgic; and (4) in surgery. When taken at meal-times it produces an agreeable sensation of warmth in the stomach similar to that of brandy or champagne. The remedy is administered in five-drop capsules, of which eight or ten may be given in certain cases. Hypodermatically it is given as a 20 per cent. solution in olive oil, of which the dose is from one-half to three drachms. The injections have not been painful nor badly borne. The results in pulmonary tuberculosis have been favorable in causing the bacilli to diminish or disappear. The symptoms of the disease are lessened, particularly after subcutaneous injection and in arthritic patients and in the early stages or in the torpid forms of the disease. With patients who tend toward the congestive and erethitic forms of disease the remedy should be administered more carefully, so that the expectoration shall not be completely suppressed lest the congestion and dyspnœa be increased. In the early stages the local and general effects are satisfactory, amelioration if not cure following the treatment. In the later stages its advantages are that the lungs are disinfected and the cough and expectoration diminished. For urinary diseases it is valuable in that it does not cause albuminuria nor aggravate it if it already exists. In cystitis secondary to prostatic enlargement, irrigation with a 2 per cent. solution cleared the urine. For embrocation a 10 to 90 per cent. balsam, the strength being determined by the intensity of the disease, has been employed with success. For this remedy the claim is made that it possesses antispasmodic, analgesic, and anticatarrhal properties. It is neither toxic nor caustic, and can be used subcutaneously. —*Bulletin Général de Thérapeutique*, 1898, 1re liv. p. 1.

The Effects of Different Anæsthetics upon the Kidneys.—DRS. W. H. THOMSON and ROBERT COLEMAN KEMP conclude, from laboratory experimentation, that ether appears to produce a special contraction of the renal arterioles, with a consequent damaging effect upon the renal secretory cells so that the kidney shrinks in bulk, secretion is diminished, albuminuria supervenes, and finally there is suppression. This change in the condition of the kidney is not due to any change in the general arterial circulation. The effect of chloroform upon the kidney is *nil.* The secretion of urine continues up to the last moment of life, and the albuminuria is so slight that its presence is apparently due only to respiratory interference. The alcohol-chloroform-ether mixture shows the special effects both of ether upon the kidneys and of chloroform upon the heart, according to the mode of administration. If a large percentage of air be simultaneously inhaled, the effect is that of chloroform, cardiac depression, without the effect of ether upon the kidneys. If the mixture is used as ether is generally administered, we have both the cardiac depression of chloroform and the renal derangement of ether combined. These objections appear to be still more applicable to Schleich's anæsthetic, for both these disadvantages are present to a greater degree than with the first-named mixture. The practical conclusions are: 1. That ether is contraindicated as an anæsthetic when renal disease is present, and particularly when, with albuminuria, there is a tendency to pulmonary œdema. 2. Chloroform is directly depressing to the heart, but does not affect the kidney. 3. There is no advantage in the alcohol-chloroform-ether mixture, but rather the reverse. 4. As for the Schleich mixture, there is a physical reason for doubting the manageability of mixed anæsthetics, due to the fact that if two agents of different maximum points of evaporation be mixed together the more volatile of them will increase the evaporation of the other, by carrying off more of the less volatile one than if the latter were vaporized by itself. That similar mixtures have been used in a number of cases without dangerous effects is no evidence that they are safe. The claim of Schleich, that mixtures of different anæsthetics of different volumes—*i. e.*, maximum evaporation points—are safer than the administration of these anæsthetics alone, is based upon the assumption that the absorption of an anæsthetic as to quantity depends upon its boiling point; the more volatile, the less is absorbed into the blood in a given time. Since these mixtures do not result in a new chemical homogeneous substance of definite chemical proportions, the exact amount of each ingredient absorbed cannot be determined.—*Medical Record*, 1898, vol. liv. p. 325.

[The observation of a considerable number of instances of the use of the Schleich mixtures in the hands of those advocating their use demonstrated to us that these, like all other mixtures, present all the disadvantages, without the advantages, of the individual contained substances.—R. W. W.]

The Treatment of Rhachitis.—Dr. Lor insists upon proper feeding and sea-baths, either hot or cold, according to the season. He prescribes phosphorus systematically, as follows: Phosphorus, 0.01; lipanine (pure olive oil with 6 per cent. of oleic acid), 30; powdered sugar, 15; powdered gum, 15; distilled water, 40. Of this a teaspoonful a day represents one-sixty-fourth of a grain of phosphorus. Large children of good digestion may take the drug dissolved in cod-liver oil. No serious disturbances have followed the use of this remedy, but it is well to omit it for four days out of every twelve. —*Revue de Thérapeutique Médico-Chirurgicale*, 1898, No. 21, p. 726.

Treatment of Acute Urethritis in the Male.—Dr. James Pedersen, in the eradication of the etiologic micro-organisms, recommends protargol in from ¼ to 1 per cent. solution as forming a clean and stable solution, unlikely to irritate, and as rapidly bactericidal. Gonococci have disappeared from the pus within two days under the administration of a 1 per cent. solution of this substance. For this time the discharge increased, then subsided, and by the sixth day became only a morning drop. The injections should, however, be continued at less frequent intervals until the gonococci cease to reappear. To terminate the inflammatory process zinc iodide and zinc chloride, of each one grain to four fluidounces of distilled water, may be used cold. If there is much inflammatory swelling of the mucous membrane the injection should be used as hot as the urethra will comfortably bear it. To repair the damaged mucous membrane silver nitrate in solution is by far the best agent because the safest and most efficient. This is to be applied by the syringe, syringe-sound, or by means of cotton through the endoscope. Solutions of from 0.1 to 2 per cent. may be employed; the last strength must not be exceeded. For the applications through the endoscope 1 per cent. is the proper strength.—*Philadelphia Medical Journal*, 1898, vol. ii. p. 336.

Dr. P. Unna notes the necessity of injections during the night as well as in the day at two-hour intervals. This is to be carried out faithfully until there is found no "morning-drop." For the next week the injections are to be administered every three hours, both at night as well as by day. Following this the interval is to be lengthened by one hour each week until, at the end of eight weeks, but one injection daily is needed. If the infection is mild the intervals may be longer, even at the outset. The formula is: zinc sulphocarbolate, 1; resorcin, 4; fennel water, 20.—*Monatshefte für practische Dermatologie*, 1898, Heft 1, S. 20.

Dr. Oscar Werler claims for aqueous solutions of silver citrate that: 1. They possess a powerful bactericidal action in that they rapidly and thoroughly kill gonococci. 2. When used by injection they are mild, painless, and unirritating, thus not adding to the inflammation nor creating lesions in the mucous membrane. 3. Further, they act deeply, so that they reach the gonococci in the submucous connective tissue without injuring it. Certain points in procedure are worthy of definition. 1. The injections should be commenced as soon as the patient presents himself after infection, not only to destroy the gonococci, but as well to establish antisepsis of the urethra. 2. The injections should be made four or five times each twenty-four hours, and this number diminished until, at the end of two or three weeks, only the evening injection is required. 3. The amount used is from one and one-half to two drachms. 4. The injection should be retained from ten to fifteen minutes. 5. The strength at the beginning is one to ten thousand, which may be increased until one to four thousand is reached. 6. When the solution is lukewarm fewer unpleasant symptoms are observed. This is accomplished by placing the bottle containing the solution in hot water before the injection is made.—*Berliner klinische Wochenschrift*, 1898, No. 16, S. 358.

The Treatment of Toxic Amblyopia.—Mr. Harold B. Grimsdale states that, while withdrawal of alcohol and tobacco generally suffices for recovery from the amblyopia caused by them, yet usually a mixture of the tinctures of nux vomica and cinchona seems to bring about a more rapid improvement. Recently, arguing by analogy from the benefit which results in cases of general toxæmia from large injections of saline solutions, De Wecker concludes that in these cases, also, when the toxæmia is apparently limited in its action to certain sensory nerves, a similar method would be successful. Cheron's solution, which contains sodium chloride, 2 per cent.; sodium sulphate, 8 per cent.; sodium phosphate, 4 per cent., and carbolic acid, 1 per cent., is injected in amounts varying from two to three and a half ounces, care being taken to inject it slowly. It is stated that as much as thirty-five grains of phenol can be injected without ill effects.—*Treatment*, No. 12, p. 353.

A New Preparation of Thyroid (Thyroglandin).—DR. WILLIAM MCLENNAN states that the thyroid gland may be administered either in the raw state or dried at a gentle heat under the coagulating point of the albumin. To either of these forms there are obvious objections, because animal substances foreign to the essential active principles are almost certain to be present, and bacteria of a dangerous kind may be introduced into the system of the patient. The thyroid contains two important principles: one of these is iodoglobulin, the larger constituent, and the other is thyroidin, discovered by Baumann. Both contain iodine, and both are requisite to produce the specific effects of the gland itself. Of the chemical processes hitherto introduced with the object of separating the active principles from the animal substances none is effectual in preserving the form or proportion in which they are contained in the gland, and consequently the results of these processes have not the same medicinal effect as the gland itself. Thyroglandin is prepared as follows: (1) Selected and healthy glands are macerated in cold water, which extracts the soluble iodoglobulin. This solution is decanted or filtered off, and is evaporated to dryness at a temperature of 212° F. The resulting product is reduced to a fine powder. (2) The residual glands are then boiled for one hour with a weak solution of caustic soda, which eliminates the thyroidin. After filtration the solution is exactly neutralized with hydrochloric acid, evaporated to dryness, and powdered. (3) The two powders so obtained are mixed together. It will be seen that by this method of preparation thorough sterilization is secured and every deleterious substance which might be derived from the other animal substances of the gland is removed, and finally the two important constituents are retained in the form and in the proportion in which they exist in the gland. This preparation, if kept thoroughly dry, does not deteriorate, and may be administered in capsule or tablet in dose of from three to five grains, equalling about one-half of a gland of average size and weight. Four instances (three of obesity, one of myxœdema) of its use are reported. —*British Medical Journal*, 1898, No. 1958, p. 79.

Superheated Air (Tallerman's Method).—DR. MARTIN MENDELSOHN points out the various effects of local application of superheated air—the subjective local sensations with these varying from slight to marked feeling of warmth. Local and general perspiration is induced often in amounts from sixteen to twenty-five ounces; to this loss of perspiration the reduction of body-weight is due. The body-temperature rises, but usually less than 2° F. The pulse-rate increases slightly during the application of the method, and upon its cessation gradually returns to its normal rate. From these observations the harmlessness of the method is claimed, and in addition its slight and temporary influence upon the general condition of the patient.—*Zeitschrift für Diätetische und Physikalische Therapie*, 1898, Heft 1, S. 52.

GYNECOLOGY.

UNDER THE CHARGE OF

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The Relation Between the Thyroid Gland and the Female Genital Organs.—Freund (*Centralblatt für Gynäkologie*, 1898, No. 32), replying to a recent criticism by de Voogt, calls attention to the fact that he (Freund), while pointing out the fact that the thyroid gland may undergo temporary enlargement physiologically under the influence of pregnancy and the puerperium, showed that permanent increase in size is noted only in cases in which the uterine muscle is subject to active and prolonged irritation. Of fifty-six cases which were carefully observed, forty four were instances of fibromyoma. In none of these was there any reason to suppose that the glandular enlargement was due to struma, as in the case reported by de Voogt.

Malignant Tumors of the Ovary.—Geyer (*Inaugural Dis.; Centralblatt für Gynäkologie*, 1898, No. 32) reports the results of operations for malignant neoplasms of the ovary at the Würzburg Clinic during seven years: 55 out of 239 cases of ovarian tumor, including papillomatous cysts, were malignant. Of these, 23 were inoperable; 16 of the 32 in which an operation was performed were cancerous, 8 patients succumbing to the operation. Recurrence occurred in three instances, 20 per cent. of the patients being cured; 81.8 per cent. of the cases of papillomatous cyst had no recurrence, and two patients died. The total percentage of cures in all cases was 46.8 per cent.

Rupture of the Ovary with Intraperitoneal Hemorrhage.—Depage (*Ann. de la Soc. Belgique*, 1898, No. 1) reports the case of a young girl who developed symptoms of acute peritonitis supposed to be due to perforation of the appendix. When admitted she was extremely anæmic and in profound collapse, with tympanites and evidences of fluid in the abdominal cavity. Cœliotomy was performed after subcutaneous injection of saline solution. A quantity of fluid blood escaped as soon as the cavity was opened, the source of the bleeding being a ruptured ovary, which was enlarged to three or four times the normal size and was the seat of interstitial hemorrhage. The patient made a good recovery.

Infection of Ovarian Cysts.—Heinricius (*Ann. de Gynécologie*, 1897, No. 4) reports a case in which the contents of a simple ovarian cyst became infected after delivery, probably from the uterus, as the lochial discharge contained septic organisms. The lymphatics or veins were doubtless the channels through which the infection was conveyed. Similar organisms were found in the peritoneal exudate.

Schwartz (*Ibid.*) observed three cases of infection in cysts, two of the patients being puerperæ. In the third case the patient was a young girl. Although tuberculosis was suspected, no bacilli could be found in the cyst contents.

Disinfection of the Hands with Alcohol.—TJADEN (*Zeitschrift für Geb. u. Gyn.*, Band xxxviii., Heft 3) draws the following conclusions from a series of nearly four hundred bacteriological observations: 1. Different micro-organisms are differently affected by contact with alcohol. 2. The thickness of the layer of tissue upon which the alcohol acts is an important factor in the germicidal effect. 3. The drug acts more intensely if the bacteria are not dried. 4. Alcohol of a strength of 75 to 90 per cent. is a stronger germicide than either absolute or 50 per cent. alcohol.

Practically, the writer advises that Fürbringer's method of disinfection be modified by dipping the hands in alcohol after soaking in sublimate solution, and again dipping them in sublimate.

Papilloma of the Fallopian Tube.—DOLÉRIS and MACREZ (*La Gynécologie*, August 15, 1898) report a third case of this rare condition, previously described by Sutton and Doran. They conclude that this papillomatous condition of the mucous membranes of the tube due to salpingitis is probably not so infrequent as is usually supposed. It is often attended by a profuse watery vaginal discharge, as well as by an intraperitoneal effusion. Tubal papillomata are benign, like those on the external genitals. They result from chronic salpingitis of a low grade, unaccompanied with inflammatory reaction or pain, the health of the patient being usually not affected. On account of their obscure pathology they deserve careful study.

Benign Tumors of the Clitoris.—LAMBRET (*Revue de Chirurgie*, May, 1898) analyzes the reported cases of benign neoplasms of the clitoris. Cysts are classified as hemorrhagic, dermoid, and retention. Of the former only three cases have been reported, the size varying from that of an egg to that of a child's head. Two cases of dermoid have been observed in this region. Winckel is the only writer who describes a sebaceous retention-cyst of the clitoris. Solid tumors are more common, thirty-one examples having been noted; three of these were osseous or cartilaginous, the others fibromata. The latter are never encapsulated, but the entire clitoris seems to be transformed into a fibrous mass containing elastic fibres and fatty tissue. The labia minora often share in this hypertrophy. Although the growth of the tumors is slow, pregnancy causes it to become markedly accelerated. Extirpation is easy, and there is no reported instance of recurrence.

Retroflexion of the Uterus.—SIELSKI concludes an extended paper on this subject (*Centralblatt für Gynäkologie*, 1898, No. 33) with an allusion to Theilhaber's criticism that in the majority of cases in which retroflexion has been corrected by operation the symptoms persist in spite of the fact that the uterus remains in its normal position. This is the case, the writer affirms, because the normal relations of the uterus are not restored, since the natural range of mobility of the organ is limited by fixation of the fundus. Coitus, pregnancy, normal filling of the bladder—all these processes are more or less interfered with. In short, the cure of retroflexion consists not in reposition and fixation, but in reposition and mobilization of the uterus.

The Prophylaxis of Retroflexion of the Uterus.—ABEL (*Centralblatt für Gynäkologie*, 1898, No. 30) affirms that the most important point in the prevention of retrodisplacement is the proper care of the puerperal woman, since Winter affirms that this condition is present in 12 per ceut. of primiparæ. The critical period is the beginning of the second week, when the degeneration of the muscular fibres has advanced and before the connective tissue has regained its elasticity. Instead of stimulating the intestines by liberal diet, it is the custom for the medical attendant to keep the puerperal woman on fluids, resorting to the frequent use of laxatives.

The writer criticises the American (?) custom of allowing patients to use the commode on the fourth day after delivery. On the other hand, he does not agree with Schatz that it is desirable to keep them in bed for two or three weeks until the pelvic floor regains its tone. Every puerperal woman should be examined in order to determine if her uterus is in its normal position. Gottschalk advises the use of a pessary as early as the seventh day after delivery if there is a tendency to retrodisplacement, the patient being kept in bed three or four weeks. If a pessary is introdued it should be as small as possible, in order not to cause overstretching of the vagina. He would have the patient lie on her side as much as possible and empty her bladder every four hours.

The writer believes that long-standing retroflexion of the uterus which has given rise to no symptoms may cause profuse hemorrhages at the time of the climacteric and delay its establishment. This may be prevented by the timely use of a pessary. Quoting statistics to show the relative frequency with which retroflexion follows removal of the tubes and ovaries, the writer infers that it is not sufficient to separate adhesions, but the uterus should be fixed in a normal position by some procedure. In twenty-six cases in which conception followed the removal of one tube and ovary the uterus became retroflexed in 50 per cent.; in others spontaneous reposition of the retrodisplaced organ occurred during the course of pregnancy.

Operations for Genital Prolapse.—GRÖNHOLM (*Finska Läk. Handlingar; Centralblatt für Gynäkologie*, 1898, No. 33) concludes a paper on this subject as follows: 1. In cystocele alone anterior colporrhaphy and repair of the pelvic floor were successful in 41 per cent. of the cases. 2. In combined cystocele and rectocele, 21 per cent. of cases followed anterior colporrhaphy and colpo-perineorrhaphy. 3. Plastic operations on the vagina are usually sufficient in uncomplicated cases of prolapsus uteri. 4. In older, hard-working women, with long-standing prolapse and hypertrophy of the cervix, also in the case of nulliparæ, or where prolapse recurs after former operations, plastic work on the vagina and ventro-fixation are indicated. 5. Ventro-fixation is always (?) indicated in cases of primary acute (?) prolapse. 6. In obstinate cases of recurrence, or when uterine neoplasms are present, it is advisable to perform total vaginal extirpation supplemented by operations on the vagina.

SCHMID (*Inaugural Diss.; Centralblatt für Gynäkologie*, 1898, No. 33) collected the histories of 237 cases of prolapse operated upon in Wyder's clinic. Seventy-two patients were seen at different periods after operation; 14 had a recurrence; in 2 the operation was a failure. Hegar's method was used in 150 cases; Tait's, in 70; total extirpation was resorted to six times on account of neoplasm, three of these patients requiring secondary operation for vaginal prolapse. Two patients died after operation, one from tetanus and one from sepsis.

MEINERT (*Inaugural Diss.*), writing of the prognosis of operations for the cure of prolapse, cites 40 cases, 23 of which were kept under observation; 21 cases in which the various plastic operations, including in a few instances ventrofixation, were performed were regarded as cured. Of these, only 12 were permanently cured; the recurrence took place, as a rule, after delivery or severe bodily exertion, at periods ranging from two to nine years.

Piccoli's Operation for Inversion.—SAVA (*Arch. di Ost. e Gin.; Centralblatt für Gynäkologie*, 1898, No. 33) reports a case of inversion of four months' standing, which resisted all the usual attempts at reduction. Three months later the following operation was performed: A transverse incision was made through the posterior vaginal fornix and the peritoneal cavity was opened. The index-finger was passed through this opening into the funnel-shaped cavity formed by the inverted uterus. Using this finger as a guide, with a blunt-pointed bistoury the posterior uterine wall was divided from the os externum to the fundus. The reduction was then easily effected, after enlarging the vaginal wound by a second vertical cut, when the incision in the uterus was closed with interrupted silk sutures. A gauze drain was placed in the vaginal wound after partly closing it. The patient made a good recovery.

Spastic Retroposition of the Uterus.—Under this term, SCHÜTZ (*Wiener med. Presse*, 1897, No. 51) describes a condition which he has found during dissections in which the sacro-uterine folds are attached to the uterus at a higher level than the os internum, while their sacral insertion is as high as the third or fourth vertebra. When they contract the result would be to bring the uterus into a position of retroflexion. This explains the clinical fact that in some cases the uterus at one time appears to be retroposed, and even fixed; while at others the same organ is found to be in its normal position and perfectly movable. The writer infers that this is a condition of "spastic retroposition," due to a sudden contraction of sacro-uterine ligaments which have the high insertion previously described.

[The writer fails to emphasize the essential difference between retroflexion and retroposition of the uterus. Attention has frequently been called to the fact that in the common cases of anteflexion with retroposition the marked shortening of the sacro-uterine ligaments, supposed to be due to a cicatricial contraction following posterior parametritis, often disappears entirely under anæsthesia, proving that it is purely of spastic origin. The suggestion with regard to the high insertion of the ligaments is an interesting one.—ED.]

OBSTETRICS.

UNDER THE CHARGE OF

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Lysol Poisoning Following an Intra-uterine Douche.—In the *Centralblatt f. Gynäkologie,* 1898, No. 39, CRAMER reports an interesting case as follows: The patient was a primipara, aged twenty-two years, who was taken in labor and examined by a physician at her home. She was sent to the hospital at Bonn, where it was found that she was seven months pregnant, in labor, the fœtus presenting by the breech. The birth of the child was not especially difficult, and the placenta was entirely expelled without delay. The patient received a vaginal douche of 1 per cent. lysol. Several hours later she had fever and rapid pulse, and the uterus was washed out with lysol, 1 per cent. The uterus was strongly anteflexed, and difficulty was experienced in introducing the douche tube. After a litre and a half of the solution had been used the patient suddenly became restless, breathed heavily, and became unconscious. The pulse was rapid and weak. In a few moments she became conscious and complained of giddiness. The pulse and temperature fell. Her child perished soon after birth, and autopsy revealed no cause for its death.

The patient developed icterus and abdominal tenderness. The urine was dark brownish-black, full of casts and blood-cells. There was considerable albumin present. An examination of the urine for phenol did not give a clear reaction. Tribromophenol was found, however, in considerable quantity. The patient died from exhaustion on the tenth day after confinement, with symptoms which were difficult to explain clearly.

On autopsy it was found that septic infection was present. At the fundus of the uterus there was an area of ulceration, from which thrombi had extended into the pelvic veins. There was also an acute hemorrhagic nephritis.

In commenting upon the case, Cramer calls attention to the condition of the urine, which contained albumin and abundant débris from the kidney. Regarding the manner in which absorption occurred when the douche was given, it is thought that lysol entered directly into the blood current through surfaces opened by ulceration. Experiment has shown that the injection of carbolic solution into the bloodvessel of an animal causes sudden collapse, exactly like that observed in this case.

Whether this alone would have proved fatal is very doubtful. A severe septic process was present in the endometrium quite sufficient to have brought about a fatal result. There were reasons for believing that the birth had been criminally induced, and abundant opportunity for septic infection had occurred. An interesting symptom in the case was the strong, full pulse, which the patient had after the first shock following the injection. This is often seen in eclamptic patients, and is very significant of acute nephritis in the pregnant woman.

It has been Cramer's custom to employ intra-uterine douches of from 0.5 to 1 per cent. lysol, using from ten to fifteen litres, and he has seen nothing but the best results from this usage. The case reported would not incline him to abandon this method of treatment.

Post-natal Transfusion and its Importance for the Fœtus.—In the *Zeitschrift f. Geburtshülfe und Gynäkologie*, 1898, Band xxxix., Heft. 1, KÖSTLIN reviews this subject and gives the results of his own experience. He first endeavored to ascertain how much blood from the mother passed to the fœtus after its birth and before the separation of the cord. To determine this he weighed the children directly after their birth and before the cord was tied, and then after the cord was separated. He also endeavored to ascertain how much blood passed from the cord as soon as it was cut. His observations were conducted upon the children of thirty primiparæ and thirty multiparæ. As regards the aspiration of blood by the child from the placenta, he did not find that such was the case. In common with other observers, however, he found evidences that the child gains decidedly in weight during the short time which elapses between birth and the separation from the mother. He found that the children of primiparæ gain less than those of multiparæ. The greater the weight of the child the greater also its gain.

As regards the exact way in which the blood passes from mother to child, he ascribed it to contractions of the uterus during the latter part of labor, which forced the blood from the maternal into the fœtal portion of the placenta. The blood-pressure in the fœtal vessels becomes much increased as birth proceeds. Uterine contractions occurring after labor are of comparatively slight importance.

He obtained little results from weighing children during the first ten days after labor. His experiments confirm the belief that it is best for the child to allow some moments to elapse after birth before tying the cord.

A New Cranioclast.—FEHLING (*Centralblatt f. Gynäkologie*, 1898, No. 43) has devised a new cranioclast with pelvic curve, composed, as usual, of two blades. When it is necessary to use a crushing instrument as well, he has devised a third blade fitting over the other two, which may be incorporated with them. A powerful compression-screw can be applied, converting the instrument into a cephalotribe.

Replacement of Retroverted Pregnant Uterus with the Elastic Balloon.—MÜLLER (*Centralblatt f. Gynäkologie*, 1898, No. 43) reports the case of a patient fifteen weeks pregnant, who had a retroversion of the womb with incarceration. Efforts at replacing the uterus failed, when it was determined to try a Braun's elastic bag. This was introduced into the vagina and carried as far back as possible The patient was encouraged to bear the pain which its presence caused, and after four hours the pain suddenly ceased and the uterus was found in a normal position. The patient went to full term and had a normal labor.

Treatment of the Retroverted Pregnant Uterus.—In the *Centralblatt f. Gynäkologie,* 1898, No. 38, Ahlfeld reports the case of a woman in the early months of pregnancy who had retention of urine for fourteen days. She had had no passage from the bowels for eight days. When the catheter was introduced, a large quantity of decomposed urine was removed, with fragments of the mucous membrane of the bladder. The patient was placed on her side and the uterus carried part way out of the pelvis. A large ring pessary was inserted, and the patient was treated by washing out the bladder and giving remedies to render the urine normal. She was urged to assume the knee-chest position as often as possible. The pessary was examined from time to time and the uterus was found to be ascending gradually to its proper position. Two weeks after the beginning of treatment the womb was in a normal position and the cystitis had almost disappeared. Three weeks after her admission to the hospital she was discharged cured. She had a normal labor at the end of pregnancy.

Artificial Dilatation of the Mouth of the Uterus During Labor.—In *L'Obstétrique,* 1898, No. 4, Demelin contributes a paper upon this subject, giving the results of his experience in artificial dilatation of the mouth of the womb during labor. The method which he advocates is bimanual dilatation, inserting one or more fingers of each hand within the cervix and gently enlarging the os, until all the fingers can be introduced.

He employed this method in treating eleven cases of vicious insertion of the placenta and had among these patients no deaths. In eclampsia the method has given him satisfactory results. It is, of course, to be employed only when labor has already begun. If the patient shows no signs of labor, the eclampsia and toxic condition present must be treated independently of labor. If, however, such treatment produces no improvement after a reasonable time, labor ought to be induced.

He recommends this method in sudden death or threatened demise of the mother, in place of Cæsarean section. In the interests of the fœtus, this method may also be employed with a good chance of success. This is especially true where the cord is compressed or where the amnion has become infected

This treatment is especially indicated in abnormal presentations, such as the brow, the parietal bone, and cross births. It may occasionally be employed together with other operations, as before symphysiotomy and often before the high application of axis-traction forceps. When labor is so prolonged that maternal exhaustion is threatened, this method is also indicated.

Demelin lost two of his forty-nine patients, one from eclampsia and one from apoplexy. He urges caution lest the operator extract the child before complete dilatation has been secured.

Coiling of the Umbilical Cord in Twins Having One Amnion.—Geisler (*Centralblatt f. Gynäkologie,* 1898, No. 38) reports a case of twin pregnancy in which there was one amniotic sac, one placenta, and one chorion, and in which the children were both males. The first was well developed and living and born in vertex presentation. The second had been dead for some time and had become partly mummified. The cord of the living child was encircled in spirals by that of the dead fœtus, and in one portion a tightly fastened knot was present. It is remarkable that the circulation of the living child had not been interfered with in this way. The writer quotes twenty-one cases of a similar nature from the literature upon the subject.

The Presence of Meconium from a Medico-legal Aspect.—BESTLER (*Centralblatt f. Gynäkologie*, 1898, No. 38) examined seventy-four new-born children to determine at what time the meconium is entirely discharged. He found that it is not expelled until the second or fourth day, and in children fed from the bottle as late as the fifth or sixth. It is evident that the presence of meconium is not a reliable sign of the age of the child.

Microscopical examination of the meconium showed epidermal cells, crystals of cholesterin, and lanugo hairs. Meconium corpuscles were also present.

An Interesting Case of Missed Abortion.—IWANOFF reports, from the clinic at Moscow (*Centralblatt f. Gynäkologie*, 1898, No. 38), the case of a patient who had her last menstruation in April, 1897, and who came into the hospital in February, 1898. Soon after her admission she was suddenly taken with pain and bleeding, and expelled a four months' ovum. The placenta and ovum were hard and whitish in color.

On examining the specimen microscopically, characteristic villi were seen and also Langhan's cells and syncytium. In other portions it was seen that the decidua of the uterus had begun to regenerate in a normal manner. The patient made a good recovery.

The case is interesting because the patient had retained the ovum so long without pain and hemorrhage, and because the uterine decidua had entirely disappeared in some places and the normal endometrium had begun to form.

Missed Abortion.—SCHAEFFER (*Monatsschrift f. Geburtshülfe und Gynäkologie*, 1898, Band viii., Heft 4) reports an interesting case, in which a blighted ovum was retained 450 days in the uterus. The patient applied to the Heidelberg clinic, complaining of menstrual colic, and asking that medicine be given to bring on menstruation. She declined an examination at that time. Later it was found that the mouth of the womb was open and that an ovum was present in the cervix. The patient was given ergot, and shortly after the ovum was expelled.

On examination the ovum was long, pear-shaped, and resembled a fibrous polyp. On one side villi and placental masses could be made out, and on the other, decidua. When the sac was opened not a drop of fluid escaped. A few clots were in the amnion. The fœtus was 10 cm. long and mummified.

There was an extravasation of blood beneath the chorion, and blood also in the amniotic cavity. The fœtus was deformed; the left eye was lacking, some of the fingers were absent, and the feet were united.

The patient's history was that she had just passed through two menstrual periods, attended with considerable pain, for the first time in thirteen months. When her menstruation ceased, more than a year before, she had every reason to suppose herself three or four months pregnant.

In discussing the case Schaeffer draws attention to the fact that the ovular decidua in these cases will be longer preserved and better nourished than the appendages of the ovum. The ovum being partially attached, the uterus does not treat it as a foreign body for some months. If the decidua of an ovum is not completely formed and abortion occurs, growth may go on after the death of the embryo. The ovum may be retained indefinitely until the endometrium has been sufficiently re-formed for menstruation to occur. From that time on, such an embryo becomes a foreign body. As a rule, the amniotic liquid persists. After the first months, however, this fluid is rapidly absorbed, as the conditions of the circulation in the embryo are favorable to such a process.

DERMATOLOGY.

UNDER THE CHARGE OF

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Dermatitis Herpetiformis Followed by Cicatrices and Epidermic Cysts.—BROCQ (*Annales de Derm. et de Syph.*, 1898, No. 7) reports a case of dermatitis herpetiformis with erythematous, vesicular, and bullous lesions, lasting a year and a half, in which the parts affected gradually took on a cicatricial aspect, and small epidermic cysts appeared similar to those observed in the affection described by Hallopeau as congenital bullous dermatitis with epidermic cysts. The treatment was by static electricity, which seemed to exert a general tonic effect and to allay the itching. In another case of vesicular dermatitis herpetiformis, in which static electricity was likewise employed, relief of the pruritus was also effected.

Ophthalmic Zoster Due to Potassium Iodide.—JACQUET (*Annales de Derm. et de Syph.*, 1898, Nos. 7, 8) presented to the Société Médicale des Hôpitaux de Paris a patient affected with a chronic blennorrhagic rheumatism, who, after the daily administration of 2 grammes of iodide of potassium for four days, developed a slight ophthalmic zoster accompanied by neuralgia of the right facial nerve. That the zoster was due to the iodide was probable from the fact that four years previously the administration of the same dose produced, at the end of some days, a left facial paralysis which lasted six weeks, and two years later the ingestion of the iodide was followed by severe dorso-lumbar pains.

Xeroform in the Treatment of Skin and Venereal Diseases.—PASCHKIS (*Wiener klin. Rundschau*, 1897, No. 42), who has employed this remedy in a large number of cases of venereal and other ulcerations, in eczema and various other diseases of the skin, has found its action very satisfactory.

Necrotic venereal ulcerations, as well as simple ones of the leg, cleaned off rapidly under its use, and healthy granulations soon appeared. A valuable feature of xeroform seemed to be the absence of all caustic action. It was usually applied as follows: After cleansing the surface of the ulcers with cotton, it was dusted on with a camel's-hair brush, and several layers of absorbent gauze, retained in place by a bandage when necessary, were applied. In eczema the excoriated areas were either treated in the same way, or they were first powdered with the xeroform and then covered with an indifferent salve or Lassar's paste.

The Treatment of Lupus Erythematosus.—UNNA (*Journ. Cut. and Gen.-urin. Dis.*, October, 1898), in a paper read before the Section of Dermatology, British Medical Association, discusses the treatment of this obstinate disease. He divides the internal remedies in use into two groups: (1) those which exert a favorable influence upon the injurious vasomotor paresis of the face, and (2) those to which a specific action has been attributed. In the first group are alkalies, carbonate of ammonia, ichthyol-ammonia, salicylate of soda, and ergot; in the second are phosphorus, salicin, iodide of starch, iodide of potassium, arsenic, and tuberculin. The author relies, however, more upon external than internal remedies. External remedies may be divided into six groups, as follows: desiccating, compressing, antihyperæmic, necrotizing, inflammatory, and specific (?) remedies. Cautious treatment may begin with the application of bandages of lead-water at night, and a dusting-powder of oxide of zinc, bole, and carbonate of magnesia during the day; or a zinc-sulphur paste with ichthyol or resorcin may be rubbed in at night; or a gelanthum, with ichthyol or soft soap, or both. As the inflammation subsides the indolent patches may be distinguished from the irritable. If the latter show signs of fixed œdema, collodion with soap or ichthyol may be applied; or for dark-red patches the micro-cautery may be used. Indolent patches must be treated more vigorously, using pyroloxin paste or the soap treatment. Before using the soap treatment, strongly hyperkeratotic patches should be peeled off with salicylic soap plaster mull. Patches on the scalp should be thoroughly treated with soft soap and then covered with pyroloxin ointment. In cases of anæmia, flushing of the face, or when there is indigestion, ichthyol may be given internally throughout the treatment.

Injections of Calomel in the Treatment of Lupus.—DU CASTEL (*Annales de Derm. et de Syph.*, 1898, No. 7) presented before the Société Française de Dermatologie et de Syphiligraphie two patients with lupus vulgaris treated with injections of calomel. After the injections a process remotely resembling that following injections of tuberculin was noticed in the diseased areas. The first patient treated presented a slight improvement, but the second showed no appreciable result. After six months' study of the method, Du Castel concludes that treatment of lupus by injections of calomel is only an adjuvant, and that it should be associated with surgical treatment.

Changes in Alkalinity of the Blood in Certain Diseases of the Skin.—M. A. TCHLENORFF (*Wratch*, 1898, xix. p. 248; and *Journal of Cutaneous* *and Genito-urinary Diseases*, November, 1898) concludes, from a series of experiments upon miscellaneous cutaneous diseases made in Pospelow's clinic, that in such dermatoses as dermatitis herpetiformis, purpura hæmorrhagica, subacute and chronic eczema, erythema multiforme, pemphigus, lichen rubra, elephantiasis, and psoriasis, the alkalinity of the blood is diminished, and that arsenic does not increase the alkalinity of the blood, and consequently acts upon the skin not by its influence upon the blood, but "in some manner not yet explained." [The action of arsenic upon nerve structure, as explanatory, does not seem to be referred to.]

Erythema Multiforme on the Buccal Mucous Membrane.—TURNER (*Brit. Journ. of Derm.*, November, 1898), at a meeting of the Dermatological Society of London, presented a patient who, after eating freely of oysters, was attacked with severe abdominal pain and diarrhœa, lasting ten days. Simultaneously, the mucous membrane of the lips and gums became very sore, white patches forming. After sixteen days the patient got better, being able to return to his work. Later, a new attack came on, accompanied by the formation of blisters in the mouth, but without gastro-intestinal symptoms. At this time there were also blisters just below the knees, on the wrists, and on the backs of the fingers, and a red rash covered the palms. After a few days the mucous membrane of the mouth was studded with large vesicles or bullæ. On the legs were collapsed, rounded bullæ the size of a sixpence, with some appearance of concentric formation, and on the heel and external malleolus of the other foot were similar lesions. On the wrists were a few vesico-pustules and the remains of bullæ symmetrically distributed.

Eczema.—MALCOLM MORRIS (*Journ. Cut. and Gen.-urin. Dis.*, October, 1898), in answer to the question, What are we to understand by eczema? concludes as follows: It is a disease the most marked clinical characteristic of which is the infinite variety of lesion by which it displays itself, originating in the action of parasites on a skin the resistance of which has been enfeebled by pre-existing disease or structural abnormality or by disordered innervation, sometimes made more intractable by gout and other constitutional states, but having no direct relation to the general health.

Angiokeratoma.—WISNIEWSKI (*Archiv für Derm. und Syph.*, Band xlv., Heft 3) reports two new cases of this affection, and from a study of them concludes as follows: Angiokeratoma is an affection of the skin which attacks the dorsal and lateral surfaces of the hands and feet, and is characterized anatomically by a dilatation of the vessels, increasing from the periphery toward the centre of the efflorescence, where it takes on the character of capillary aneurisms. It generally appears after long-continued and repeated attacks of chilblain. Before the chilblain the fingers and toes are usually cyanotic, blue, and somewhat swollen, so that this period may be regarded as the preliminary, and the chilblain as the second stage, after which the angiokeratoma appears. It occurs in young individuals. Its connection with tuberculosis is doubtful. It may be regarded as a disease endemic in certain districts, since Audry's thirty-four cases all came from the vicinity of Toulouse, and eight out of the twenty-five cases reported by Escaud came from the same locality.

Xanthoma Glycosuricum.—SCHWENTER-TRACHSLER (*Monatsh. für prak. Derm.*, September, 1898) discusses the subject at length, and concludes that this disease occurs chiefly in middle age, and generally in corpulent persons who are otherwise healthy. Sugar is always to be found in the urine. Men are most frequently affected. Icterus stands in no relation to this disease. The cutaneous lesions are thick, firm, pinhead and pea-sized papules, circumscribed, and embedded in the skin; are yellow on their summits, and have a red base; some of them may be merely red papules. They may remain months or years. The extremities are especially liable to invasion, and where the lesions are numerous they incline to coalesce and to form patches, especially about the elbows. The prognosis is in general favorable, although the lesions tend to recur, but this depends on the glycosuria.

OTOLOGY.

UNDER THE CHARGE OF

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Cylindroma of the Concha.—R. HAUG (*Archiv f. Ohrenh.*, September, 1897) reports the occurrence of cylindroma in the concha of a woman, aged sixty-five years. The tumor, in the course of twelve years, grew from the size of a cherry to that of a pigeon's-egg. Extirpation of the tumor was accomplished by means of scissors and knife. Entire recovery ensued in seventeen days. Haug claims that this is the first instance in which a cylindroma has been reported, with histological proof, as originating in the ear.

Foreign Bodies in the Ear.—R. HAUG (*Deutsche med. Wochenschrift*, February 3, 1898) reports another case illustrative of the evil results of trying to remove a foreign body from the ear by means of forceps and hooks, instead of by syringing. In this case, when the patient was sent to Haug, on the ninth day of the disease, the auditory canal was in a high state of phlegmonous inflammation, the auricle and surrounding region swollen, and the cutis of the osseous part of the auditory canal torn out by the manipulations of an unskilful surgeon, so that the periosteum was exposed. The foreign body, a bean, could by means of a probe be felt firmly embedded, but could not be seen through the swollen and closed canal. As pain in the ear and mastoid increased, and headache, vertigo, nausea, and fever set in, and as it was impossible now to remove the swollen bean through the inflamed and narrowed meatus, the auricle was detached behind and thrown forward, when it was found that the foreign body had been pushed through the membrana tympani into the drum-cavity and rested upon the promontory, where, by reason of the swelling of the bean, from the constant bath of pus in which it lay, it was firmly wedged in the drum-cavity, and was removed only after chiselling off a portion of the osseous canal near the membrana, which liberated the foreign body. Entire recovery took place in about two months. (The *first effort* that any one should make to remove a foreign body from the ear should be by syringing warm water or oil into the external auditory canal, after the physician has assured himself by ocular inspection that a foreign substance is in the ear. If a physician cannot examine an ear with otoscope and speculum, and then syringe the ear, he should let the case alone. Usually syringing is sufficient to remove a foreign substance from an ear; if it is not, *any other effort* with *any kind* of instrument should be made only by an expert.) The importance of a cautious and gentle removal of foreign bodies from the ear is emphasized also by J. M. KERSHAW *Clinical Reporter*, St. Louis, Mo., August, 1897) and all others of experience. LIARAS (*Journ. de Méd. de Bordeaux*, April, 1897; *Archiv f. Ohrenh.*, December, 1897) found two fleas in the ear of a patient in Moure's clinic. He recommends killing the insects with a drop of ether or chloroform on cotton inserted into the ear, before finally syringing them out.

CARETTE (*Annales des Mal. de l'Oreille*, etc., February, 1898) records the case of a young man who, by the accidental discharge of a pistol in his own hands, received the *bullet in his auditory meatus*, where it moulded itself firmly to the walls of the canal near the junction of the cartilaginous with the osseous portion. The only symptom evoked was a mechanical deafness and a slight synovitis of the adjacent maxillary joint. Detachment of the auricle from the osseous canal, after an incision behind it, enabled the operator to remove the impacted bullet by means of gouges and drills. Entire recovery in all respects took place under antiseptic treatment in one month.

Furuncles.—JOUSSET (*Nord. Med.*, 1897, No. 58; *Archiv f. Ohrenh.*, December 17, 1897) points out the important fact that in furunculosis of the external ear, careful differential diagnosis must often be made between it and diffuse otitis externa, abscess of the membrana tympani, and even mastoid empyema.

LEUTERT (*Archiv f. Ohrenh.*, November, 1897, No. 23) has described the symptomatology occurring in connection with a peri-auricular abscess ensuing upon the rupture of a furuncle through the cutaneous part of the auditory canal. Such symptoms are of interest because of the differential diagnosis they render necessary between a peri-auricular abscess and abscesses starting in the mastoid.

Hyperostosis of the Auditory Canal.—HARTMANN (*Zeitschr. f. Ohrenh.*, Band XXX.; *Archiv f. Ohrenh.*, December 17, 1897), following Virchow, draws attention to the great difference between diffuse hyperostoses and exostoses of the auditory canal. The former he regards as disturbances of development in the pars tympanica of the temporal bone, whereas exostoses are pathological products.

J. GRUBER (*Austrian Otol. Soc.*, April 27, 1897; *Wiener med. Woch.*, July 24, 1897) found hyperostosis of the auditory canal in connection with a piece of straw firmly embedded in the membrana tympani. It seems to be a question whether the irritation of the straw produced the hyperostosis.

Two peculiarly-shaped exostoses of the auditory canal near the membrana have been observed by H. A. ALDERTON (*Annals of Otol., Rhin., and Laryn.*, February, 1898), one in a woman aged eighteen years, the other in a man aged forty years. (These were considered gouty products, but their proximity to the termini of the annulus tympanicus would suggest that they were connected with the spina tympanica anterior and the spina tympanica posterior, respectively.) Hyperostoses resembling these are described by POLITZER (*Austrian Otol. Soc.*, April 27, 1897; *Wiener med. Woch.*, July 2, 1897), who attributed them to anomalous development of the free ends of the annulus tympanicus at this point. It is a failure in union between these points and the outer surface of the tympanic process of the squama. G. P. FIELD (*Lancet*, July 3, 1897) believes, with many others, that hyperostosis of the auditory canal is caused by the entrance of cold water into the ear. The dental lathe is recommended by him as the best means for their removal. Prognosis is favorable if they are thus removed. H. KNAPP (*Ann. des Mal. de l'Oreille*, January, 1898) has successfully removed by enucleation an obstructive exostosis from the external auditory canal after detachment of the skin over the bony growth. Immediate relief to the pain in the head and ear from which the patient suffered followed the operation and the wound healed by first intention. There had been a chronic purulent discharge from the ear in this case for twelve years.

Fractures of the Auditory Canal.—V. GALETTI (*Ann. des Mal. de l'Oreille*, April, 1898) points out that the symptoms of an indirect fracture of the external auditory canal are pains in and about the ear, difficulty in chewing and swallowing, epistaxis, otorrhagia, paracousis, deafness, vertigo, loss of consciousness, mydriasis, delirium, and vomiting, thus making difficult the differential diagnosis between such a fracture and fracture of the base of the skull.

Primary Otitis Externa.—C. J. M. SCHMIDT (*Ann. des Mal. de l'Oreille*, January, 1898) describes three forms of primary otitis externa, viz.: 1. The form limited to the epidermis analogous to ichthyosis. 2. An affection of the corium resembling dermatitis when mild, eczema when more severe. 3. An affection of the epidermis only. Much depends upon the prophylaxis, and scratching the ear is sternly forbidden. The hemorrhagic form is nearly always traumatic. H. SCHMALTZ (*Archiv f. Ohrenh.*, November 23, 1897) has observed that otitis externa generally occurs in those whose scalp is affected with seborrhœa and also in those suffering from acne of the face. The ear disease yields when the disease of the scalp is controlled. Therefore, he has named this form of otitis externa, connected with the aforesaid disease of the skin, *seborrhœic otitis externa.*

Burns of the External Auditory Canal and Membrana Tympani.—O. SCHWIDOP (*Archiv f. Ohrenh.*, December 17, 1897) points out the fact that the external auditory canal is often scalded by various domestic remedies, applied to the ear. The external auditory canal and the membrana tympani are often scalded by the instillation of various alcoholic and ethereal fluids for the cure of toothache.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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The Educative Treatment of Convergent Squint.—PRIESTLEY SMITH (Birmingham, England) prefers the term "educative" to "orthoptic" as better indicating the essential idea of this kind of treatment; and he regards it as having parallel importance with the optical and the operative treatment of strabismus. From his study of it he concludes:

Convergent strabisumus is a disorder of innervation in which the visual centres fail to control the act of convergence. This act is thereby degraded. It becomes purely automatic and purposeless. It is excited by the associated act of accommodation. It is excessive because it is uncontrolled.

The failure of control depends largely on faulty development of the visual apparatus. The fault, whether it be in the eye or in the central organs, is frequently hereditary. In many cases the power of control is lost through shock or illness during infancy.

Hyperopia, when of considerable degree, predisposes to strabismus, and sometimes causes it by demanding an abnormal effort of control. Hyperopia of low degree does not account for strabismus in a child.

The disorder is confirmed and perpetuated by suppression of the function of the squinting eye. In treating it we should aim at stopping this habit of suppression and establishing the habit of binocular control.

The means employed in the educative treatment include: 1. The occlusion of one eye by a shade or pad. Usually it is the "good" eye which is occluded to compel the use of the squinting eye, to promote its true fixation, and to improve its visual acuteness. But if it becomes necessary at times to use the "good" eye, the shade should be transferred to the other. For the squinting eye had better be in darkness than continue to form images which the brain does not perceive.

2. Bar-reading—that is, reading with a ruler or something of the kind held between the page and the face, so that a part of each line is hidden from either eye alone, and the two eyes must be used to read the whole of it. This helps the recovery of binocular vision by making the patient conscious

each instant of the deviation, and by compelling the movements necessary to fix with the squinting eye. It is not applicable to very young children.

3. The use of "fusion-tubes" is useful for children who cannot read. These are two tubes each of which has a convex lens in the end held toward the eye, and a shutter with a small hole covered with ground-glass in the other. The distance from the lens to the shutter is the focal distance of the lens. The tubes are connected by chains, so that they can be turned in the direction of the two visual axes in any case of squint. The exercise with them consists in making the two holes appear as one, and in keeping them fused as the direction of the tubes is slowly changed. This cultivates the faculty of binocular fusion.—*Ophthalmic Review*, June, 1898.

[The occlusion of one eye should be confined to cases in which the squint is constant. Interruption of binocular vision may convert an intermittent strabismus or even a heterophoria into an actual or constant deviation.—ED.]

Operative Treatment of Lesions of the Frontal Sinus.—S. S. GOLOVINE (Moscow) holds that when operative treatment is necessary it ought to embrace two conditions, viz., that the cure should be complete and that the patient should not be disfigured by the operation. Curettement through an opening made with a trephine is never satisfactory, because one is not sure that the curettement is complete. Golovine has, in three cases, made an osteoplastic opening into the sinus. A T-shaped incision is made at the inner extremity of the brow through the soft parts. Then a bone flap of the required size is made, convex upward, and with its base corresponding to the inner third of the orbital ridge. Through this the sinus may be thoroughly cleaned out. A drain is put through into the nose, and the bone shutter turned back into place. The drain is to be kept in two months; and at first the wound is washed daily, using hydrogen dioxide.

In three cases he has resorted to cauterizing the interior of the sinus with steam. This may be done through a fistula or through a small trephine opening at the upper inner angle of the orbit. The injection must be of live steam, not of condensed, hot, watery vapor. It should be continued from one-quarter to one-half minute, and may be repeated after several minutes. This is followed by suppuration and slow granulation within the cavity, five or six months being required for its complete obliteration. The post-operative treatment is daily irrigation with hydrogen dioxide. By experiments on dogs it was demonstrated that this treatment was followed by the complete filling of the cavity by bony tissue, which at the end of a year resembled slightly hardened diploë.—*Archives of Ophthalmology*, vol. xxvii., No. 3.

Sympathetic Ophthalmia.—GEO. FERDINANDS (Aberdeen) reports two cases of ophthalmitis occurring long after the enucleation of the fellow eye for injury. In the first case the injured eye was removed, probably several weeks after the injury, the other eye having become "weak." Fourteen years later the patient had the socket operated on, and commenced wearing an artificial eye, but only occasionally. Three years later she was in poor health, and returned with iritis and keratitis punctata. Later she had several relapses, controlled by atropine. She retained vision = 6/XVIII.

The second case was one in which the injured eye was enucleated four days after injury. Twenty-one years later the patient found the artificial eye gave him pain in the brow, and noticed impaired vision and signs of inflammation in his good eye. When seen several months after this there was well-marked iridocyclitis, the eye was very sensitive to touch, and there was severe neuralgic pain in the brow and temple. Subsequently there were relapses and ulceration of the cornea. Vision was reduced to counting fingers at four feet. The fundus could not be seen.—*British Medical Journal*, June 18, 1898.

CECIL E. SHAW (Belfast), from a study of sympathetic ophthalmia, made under the auspices of the Scientific Grants Committee of the British Medical Association, concludes that since the publication of this theory practically the whole weight of the experimental evidence and the greater portion of the clinical evidence fails to support the migratory theory (migration of germs along the optic nerves) or is actually opposed to it; that it can only stand on the assumption that the migratory germs can neither be inoculated, cultivated, nor stained by any known method. We are obliged to fall back on some form of the old theory, that sympathetic ophthalmia is due, partially if not entirely, to irritation of the ciliary nerves.—*British Medical Journal*, June 18, 1898.

[Ferdinands says that in his cases the symptoms and progress were identical with those of sympathetic ophthalmitis. But these are only the symptoms and progress of a bad irido-cyclitis from other causes. Sympathetic ophthalmitis is not certainly anything more than an irido-cyclitis following injury and similar inflammation of the other eye when this is not enucleated. The connection of the irido-cyclitis with the loss of the other eye by injury in these cases is, therefore, extremely doubtful. Of course, if the essential morbid factor of sympathetic ophthalmitis is a nerve irritation, it is possible that this may be transmitted from other than the ciliary nerves.—ED.]

Anæsthetic and Germicidal Actions of Holocain.—R. L. RANDOLPH (Baltimore), from a use of the drug (in a 1 per cent. solution) in fifty-four cases, concludes that it is an effective local anæsthetic. Applied as is cocaine for cataract extractions and iridectomy no difference was observed in the anæsthesia produced by the two drugs. For foreign bodies on the cornea, pterygium, etc., the quickness with which anæsthesia was produced (less than two minutes) was striking. The absence of desiccation of the cornea, dilatation of the pupil, and slight subsequent photophobia render holocain useful for the removal of foreign bodies from the cornea.

From bacteriological experiments Randolph concludes: In solution of the above strength holocain possesses distinct germicidal properties. Exposed to it, pus organisms lose their vitality within twenty-four hours. Exposures of from five to thirty-five minutes showed in every instance a gradually diminishing number of colonies, showing that in those exposures many of the organisms were killed.—*Bulletin of the Johns Hopkins Hospital*, July, 1898.

[The bactericidal power of holocain gives it the advantage that solutions of it will keep themselves sterile without the addition of another germicide. We have no perfectly reliable germicide that can be added to cocain solutions without serious disadvantage, and we must, therefore, depend on heat in sterilizing such solutions.—ED.]

HYGIENE AND PUBLIC HEALTH.

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England's Declining Birth-rate and Marriage-rate.—Dr. H. May (*Public Health*, September and November, 1898) calls attention to the fact that the birth-rate for the whole of England and Wales fell uninterruptedly from its highest point, 36.3 in 1876, to 30.1 in 1890, and again, with fluctuations, to 29.7 in 1896–1897, and asserts that this fall is proof of a general change in the social habits of the country. Coincidently there has been a considerable but not so pronounced fall in the marriage-rate, which reached its highest point, 17.6, in 1873, then fell during the next six years uninterruptedly to 14.4, and has fluctuated since then between 14.2 and 16, the latter figure being for 1897 and the highest for twenty years. The decline in the birth-rate amounts to over 15 per cent. and in the marriage-rate to 10 per cent., and the latter will account for only part of the former. The balance of the decline in the birth-rate he ascribes to other and unnatural causes. It appears that the registered deaths from premature birth have risen steadily from fourteen per thousand in 1882 to nineteen in 1896, and the deaths from abortion and miscarriage from six to fourteen per million of the population in the last ten years. The great fall in the general death-rate should show a diminished infantile death-rate, but, instead, it appears that the mortality of children under a year shows no decrease. He points out that the changes in the birth-rate and marriage-rate will produce a derangement of the age distribution, causing the proportion living at different age-periods to vary and rendering the number of each at a census an imperfect guide to the following inter-censal years. A part of the fall in the general death-rate is accounted for by the fact that the number of children under five fell from 136 to 122 in 1000 between 1881 and 1891, a diminution which would necessarily affect the general death-rate, inasmuch as the rate at that age period is very high.

The marriage-rate of the country can no longer, he says, be considered as the "barometer of its prosperity," for in the year of highest prosperity during the past twenty years it was but 16, which is no higher than the lowest rate of any of the preceding twenty year periods. He attributes the decline to "an intelligent selfishness produced by modern civilization" and shows that marriage is postponed and early marriages are especially diminished. Marriages under twenty-one years have fallen, in the period 1885–1896, from 81 to 59 per 1000 males, and from 230 to 188 per 1000 females married. The mean age at marriage shows considerable increase, and this increase is steady. There is a general increase in the age of marrying bachelors, a smaller one in that of spinsters, a considerable one in that of marrying widows, but a slight decrease in that of widowers. The increase in the number of marriages of persons over thirty years of age amounts to 94 per 1000.

Infection from the Hands of Tuberculous Persons.—DR. E. R. BALDWIN (*Philadelphia Medical Journal*, December 3, 1898), while conceding that the danger from a few tubercle bacilli on the fingers is very slight, draws attention to the scant mention of that mode of infection in the abundant literature of the subject. With the object not so much to determine the degree of danger from infected hands, as to note the differences in respect of the presence of bacilli on the hands of tuberculous patients who use handkerchiefs for the reception of sputa and those using cuspidors or cloths, he instituted a series of experiments in which he washed the fingers of twenty-eight persons in whose expectorations tubercle bacilli were known to exist. Ten of these were private patients, half of whom used cuspidors and occasionally handkerchiefs, and the other half either cuspidors or cloths; the others were sanitarium patients who used cuspidors only. The patients had no knowledge in any case that the tests were to be made, and the time that had elapsed since the last previous washing varied from ten minutes to twelve hours. The washings from the ten private patients and from five of the others were used to inoculate guinea-pigs, two of which were taken for each case. In eight of the ten private cases one or both of the pigs became tuberculous; in the other two the results were entirely negative, and it deserves to be noted that the two patients concerned were scrupulously careful to keep their hands from becoming soiled. In two of the five sanitarium cases, one pig in each was found to be tuberculous. The washings from the other thirteen were centrifugated and examined microscopically, and in three of the sediments the bacillus was found.

In conclusion he submits the following points:

1. Living tubercle bacilli are not infrequently present on the hands of patients who are not careful in the use of handkerchiefs, cloths, and even cuspidors when the expectoration is abundant.

2. No precaution against contamination of the hands can avail better than the use of cuspidors combined with frequent ablutions with soap and water.

3. With the present usage of society, people are not likely to use pocket-cuspidors, except in institutions. Consequently, handkerchiefs will be used in public, especially as anti-spitting laws are forcing individuals to use them. There is, therefore, urgent necessity for a cheap, comparatively impervious and soft handkerchief that can be burned.

Germicidal Action of Alcohol.—DR. RAFAEL MINERVINI (*Zeitschrift für Hygiene und Infectionskrankheiten*, xxix., October 25, 1898) was experimenting with alcohol as a disinfectant when Epstein's results were published (see this JOURNAL, September, 1898). As his results were not in entire agreement with these, he undertook the whole investigation over again and enlarged its scope. His published conclusions are as follows: Alcohol has in general a very slight germicidal action. At normal temperatures it may kill non-spore-bearing bacteria, but not the spore-bearers. Its action is strongest in 50 to 70 per cent. strength and weakest when in strongest concentration (absolute alcohol). When boiled, or heated under pressure, it acts according to its percentage of contained water. Alcoholic solutions of disinfectants have less effect than the corresponding aqueous solutions, and their germicidal power varies inversely as the strength of the alcohol in which they are dissolved.

Physiological Action of Copper in Foods.—The widely different opinions of the importance of copper in foods led BAUM and SEELIGER (*Zeitschrift öffentl. Chem.*, 1898, through *Zeitschrift für Untersuchung der Nahrungs und Genussmittel*, July, 1898) to carry on a series of experiments on the subject that extended over three years. The questions at issue were as to chronic poisoning, the elimination of copper in the milk, its deposition in the fœtus, and the comparative poisonous influence of the several copper compounds, the intensification of the influence by increased doses, and the pathological changes in the different organs.

The conclusions reached were as follows: Copper taken by the mouth is, as a rule, not eliminated in the milk; occasionally it appears in small traces, and very exceptionally in weighable amounts. The milk of animals that had been dosed for a long time exerted no perceptible deleterious effects when fed to others, even when it constituted the sole food. Absorbed into the system from the alimentary canal, the metal enters the fœtus in comparatively large amounts and is stored in its organs. Given in small daily doses it is almost wholly absorbed and in great part again eliminated, but the administration of larger amounts is not followed by increased absorption; on the contrary, absorption is not infrequenly lessened. Thus absorption and elimination appear to go on with no fixed rules. Elimination by bile and pancreatic and intestinal juices may be extended as much as five months after the administration of the last dose, and it may be complete in from four to five weeks. Long-continued administration of small doses may produce a true chronic poisoning. The several preparations possess different degrees of toxicity. The most poisonous is the oleate, then the acetate, then the sulphate, and lastly cuprohæmol, which, even in very large doses, produces hardly a perceptible effect.

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CEREBELLAR TUMOR.

RECOGNIZED CLINICALLY, DEMONSTRATED BY THE X-RAY, AND PROVED BY AUTOPSY.

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Any means of investigation which will facilitate the diagnosis of intracranial disease will be welcomed. Many investigators have sought the assistance of the X-ray apparatus in this connection; but, aside from its value in placing bony formations, bullets, and similar foreign bodies, it has failed to render any particular assistance. Obici and Ballici[1] were enabled to get trace of a growth by the X-ray in the case of a boy who had died from brain tumor, the examination being made post mortem. Subsequently, upon introducing tumors of various sorts within the brain-mass of cadavers, they satisfied themselves that localizing shadows could sometimes be secured. Similar experiments previously made by others had given negative results.

Through the courtesy and unusual skill of Mr. W. H. Fuchs, of Chicago, I was enabled in the case which is here briefly reported to secure two X-ray pictures which seemed to indicate strongly the presence of a growth in the right posterior cranial fossa. The case presented many of the classical symptoms of cerebellar tumor, enabling me to make a diagnosis of such a growth, located probably on the right side, as indicated by the greater asthenia of the right limbs.

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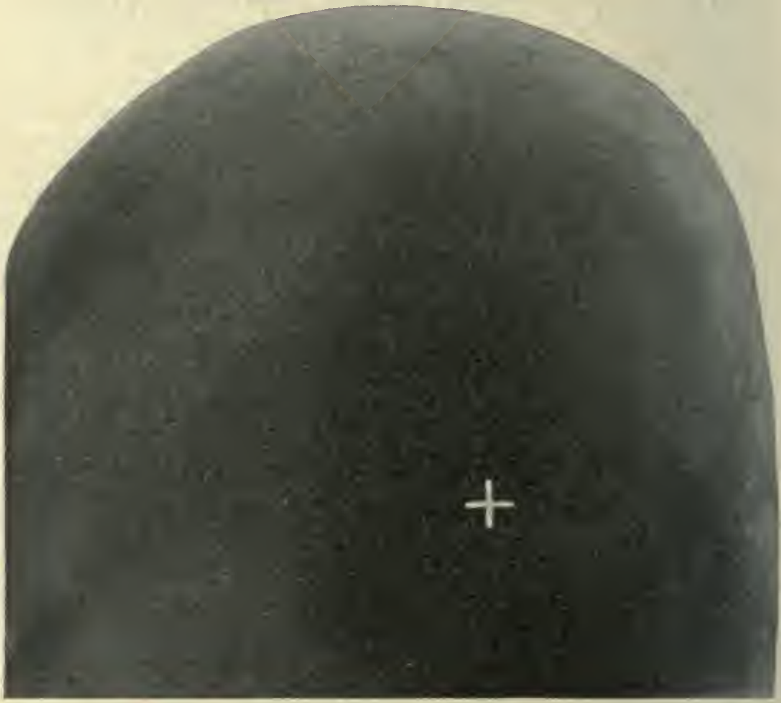
[1] Rivista di Patholog., October, 1897.

Upon reference to the skiagrams, Fig. 1 indicates the picture that might be seen as upon the fluoroscopic screen, the observer standing behind the patient. In Fig. 2 the observer would stand to the left of the patient, the light being on the right side of the head. The divergence of the rays from the luminous point will account for the extent of the shadow in these pictures when compared with the tumor subsequently obtained by section and represented in Fig. 3.

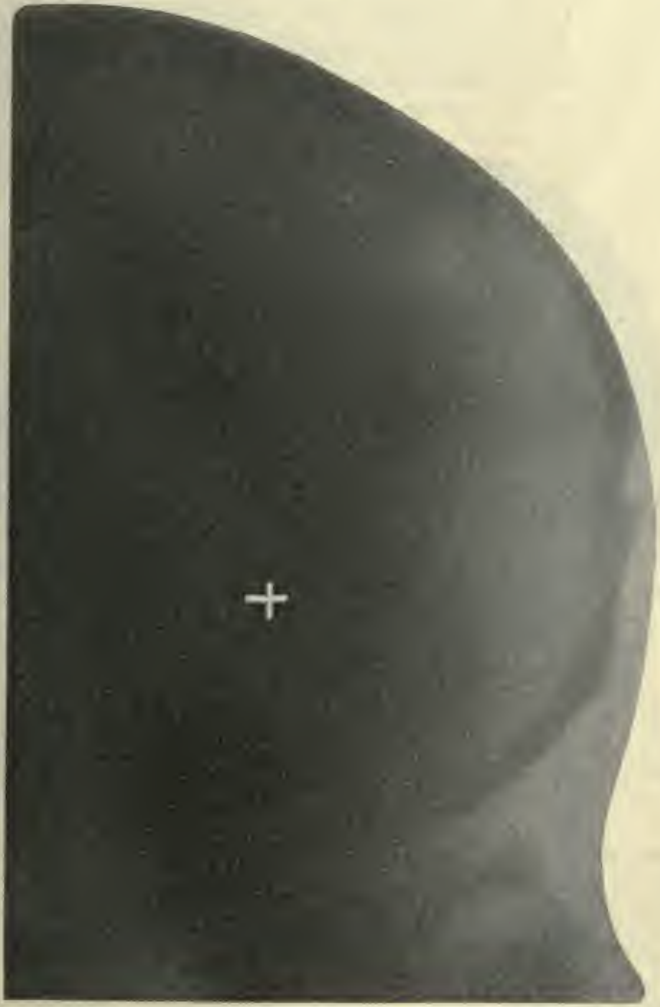
FIG. 1.



X-ray picture showing shadow made by right-sided cerebellar tumor. The white + is at about the centre of the shadow.

This boy was exhibited before a class of physicians at the Northwestern University Medical School in June, 1898, and the pictures were presented at that time as serving to prove the presence of the tumor and at the same time the value of the X-ray as a diagnostic agent. The supposition was expressed that the shadow could not be produced by a growth of a character homogeneous with that of the surrounding brain-tissue, and that in all probability it must be one of a highly vascular character, as it was presumed the blood in the tissues of the tumor gave the shadow. This supposition was seemingly confirmed at the autopsy, as the tumor was found to be highly vascular, the seat of a number of old hemorrhages, and also to contain a considerable sized clot of recent origin, the development of which had probably been the cause of the boy's sudden death. Calcareous masses would certainly give a shadow; and tuberculomata, dense fibromatous tumors, and thickly encapsulated abscesses and tumors might do so.

FIG. 2.

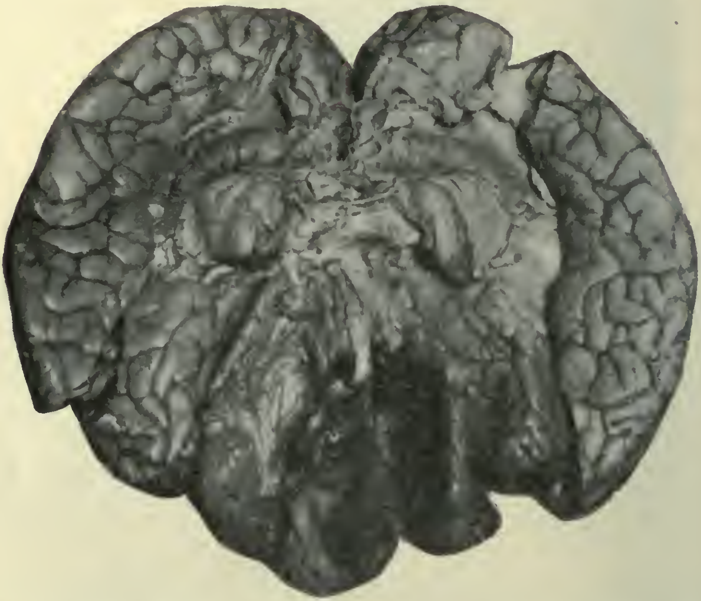


X-ray picture showing shadow made by lemon-sized right-sided cerebellar tumor. The white + is at about the centre of the shadow.

In each skiagraphic cut the centre of the shadow is indicated by a white cross, and it is interesting to note that on the negative of Fig. 2 a lobulated outline could be clearly distinguished and can also be seen upon the better prints made from the negative. A similar outline is seen in the transverse section of the tumor in Fig. 3. The tumor, from its relation to the fourth ventricle, was inoperable.

Mr. Fuchs states that it is important to make an exposure of proper duration, in order to secure these results; that under-exposure or over-exposure produces an entirely different picture. An ordinary focussing tube of proper vacuum was employed at a distance of eighteen inches from the photographic plate on which the head rested. The exposure was three and a half minutes.

FIG. 3.



Photograph of brain containing cerebellar tumor, seen from above. The lateral ventricles have torn open. The tumor has been incised longitudinally.

John C. H., aged fifteen years, a schoolboy, was admitted to the Florence ward of St. Luke's Hospital, in the service of Dr. Church, March 7, 1898. The family history contained nothing noticeable in reference to this patient. His mother stated that previous to two years before the time of admission the boy's general health had been perfectly good; that he had been an active, intelligent, and energetic lad, strong and well developed. At the time indicated he had a number of attacks of vomiting, which usually came on early in the morning, preceded by a headache and attended by a cough. There did not seem to be a great deal of nausea, and the vomitus usually consisted of a quantity of thick, yellow fluid. About seven months previous to hospital admission, the parents had noticed that he was uncertain on his feet, with a slight tendency to drag the right foot. The gait became more and more impaired, and at the time of admission was of the staggering variety, with perhaps a slight tendency to deviate to the right in walking forward. On the 14th of January previous he had a convulsion in the night. It lasted about half an hour, and as far as could be learned involved all four extremities about equally. On the 18th of that month, and on February 13th following, he had two other convulsions of a similar character; the muscles were rigid, and all four limbs were affected. He did not bite his tongue or froth at the mouth, but was extremely pale and entirely unconscious. Following the attacks he was sleepy, depressed, and apathetic for two or three days. Headaches of a severe character were a frequent complaint, the point of greatest intensity being usually in the occipital region, but sometimes the pains were frontal in location.

Upon admission the boy was noted to be a well-grown, rather flabby, pale, apathetic-looking individual, who was content to spend most of his time in bed, and usually complained of headache. He walked with a drunken stagger, departing about equally to the right and left, and was quite unable to walk a straight line. The control of the legs seemed to be quite inadequate, and the feet did not seem to be securely attached at the ankle-joint. Although he did not drag his toes, he was inclined to stumble over slight obstacles. The muscular strength in all four extremities seemed to be reduced about 50 per cent. as compared with that of another lad of the same size, and the right hand and leg were weaker than the left, though the lad was naturally right-handed. All tendon-jerks were greatly reduced, and the knee-jerks could not be obtained even by reinforcement. Cutaneous sensation and sphincteric control were normal. There was a slight tendency to lateral nystagmus when the eyes were directed strongly to the right or to the left, and the boy admitted that he had at times seen double. Pupils normal, slight inability to converge. The ophthalmoscope showed a slight blurring of the margins of the disk. No tenderness or localized elevation of the temperature over the cranium. The percussion note was practically the same on both sides. Hearing normal, smell and taste normal, tongue clean, physical functions well performed.

Under iodide of sodium, during the next three months, the boy made considerable improvement in his gait, was brighter, had but one or two slight convulsions, the vomiting subsided, and the headaches were much better. The knee-jerks reappeared. X-ray photographs made in April, 1898, gave the results shown in the accompanying cuts. On account of the improvement and the unfavorable location of the tumor, the idea of operation was not entertained.

In November, 1898, examination showed the following conditions: Pupils present a tendency to dilate, but respond promptly to light and accommodation; knee-jerks slightly exaggerated, but diminished upon attempts at reinforcement, equal on both sides; muscular power symmetrical and normal. Station fairly firm, but walking and standing with eyes closed very difficult; sudden turning to the right or the left induces a staggering, cerebellar gait, which is also manifest to a less degree in walking with open eyes. General sensation and special senses normal. Complains of a feeling of weakness in the legs, and has been having slight convulsions about once a month. These, according to the observation of internes and nurses, are general in character. At times he complains of a slight frontal headache, usually upon waking in the morning. No apparent change in the eye-grounds.

On November 28th, after a day of headache, a severe convulsion occurred and the patient suddenly died.

For the following post-mortem notes I am indebted to Dr. F. X. Walls, pathologist to St. Luke's Hospital:

The bones of the cranial vault are very thin, averaging perhaps 4 mm. in thinnest portion, and are unusually translucent. Meninges and venous sinuses negative. Brain substance very tense.

In the posterior fossa of the skull was found a tumor of the right cerebellar hemisphere, about the size of a lemon, occupying the superior and anterior surface of the right hemisphere and tensely bulging in all directions, more especially forward and upward. The anterior part of the tumor was free from cerebellar substance, and was covered with a very thin layer of plastic lymph, which exudate extended downward and toward the median line, matting the tissues in the region of the foramen of Magendie. The remainder of the tumor was buried in the substance of the right cerebellum.

On sectioning the tumor its centre was found to contain about an ounce of clear fluid that was slightly blood-stained. Surrounding this central cavity the tumor-tissue was deeply infiltrated with blood that evidently was a recent hemorrhage. The rest of the tumor was of solid consistency and had the characteristic gelatinous appearance so suggestive of glioma, and especially marked was the infiltration of the tumor-tissue into the cerebellar substance at the periphery of the growth, so that a distinct line of demarcation between the neoplasm and the normal tissue was not to be made out in the fresh specimen.

The lateral ventricles were dilated and distended with over a litre of clear fluid, which would readily be explained from a consideration of the size and location of the tumor.

The other organs showed subserous punctate ecchymoses and visceral congestion, such as occur in death during convulsion.

Histologically, the study of the tumor has not been completed, but, from a consideration of a teased specimen in which branched neuroglia cells can be demonstrated, we can affirm that the tumor is a glioma. A specimen stained in hæmatoxylin and eosin shows a cellular tumor with abundant small nuclei, mostly round or oval, surrounded by a granular protoplasm; the branching of the cells is not to be made out, but this we hope to be able to demonstrate later by special staining methods.

The bloodvessels through the periphery of the growth are not numerous, but their walls are slightly thickened, while toward the centre of the tumor the bloodvessels are unusually numerous, have very thin walls, and are very much dilated with red blood-cells, giving in places the appearance of a cavernous hemangioma.

The tissue lining the central cavity is much denser than the rest of the neoplasm, fewer cells are present, and the tumor here has a wavy, homogeneous, colloidal appearance. In this tissue are areas of recent hemorrhagic infiltration and also dense masses of blood-pigment, the vestiges of ancient hemorrhages.

CARCINOMA OF THE PANCREAS.

EXPLORATORY OPERATION; STUDY OF THE FAT ABSORPTION.

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AND
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Clinical History by Dr. Northrup.

There are two features of especial interest in this case, viz., the diagnosis of the character of the disease and the location of the lesion in the head of the pancreas. The history is as follows:

The patient's father died of "cancer of the throat." His personal history is that of an exceptionally healthy, robust, enduring man of large physique, ruddy; in short, a man having all the physical features of an ideal coachman. A better glimpse of his regular life, temperance, and habits cannot be given than to state the fact that from early manhood to the time of his death he had never been out of employment, and had been coachman in all that time to but three families, two of them being Governors-General of Canada, the third a United States Senator.

The patient was forty-six years old and married. When first taken sick he weighed 220 pounds. His first symptom was pain in the back. Exposure while sitting upon the box in bad weather was set down as the cause of his illness, and he was allowed to send the second coachman when the weather was unfavorable. The rheumatism of the back grew no better, but he again forced himself to do full duty as driver. The pain at length grew so much worse that he could not endure long waits, and sought professional advice for the increasing rheumatism of the back. The first course of treatment given him was potassium iodide in increasing doses, with the application of the cautery along the skin of the dorso-lumbar region. This afforded temporary relief, but soon it became evident that the pains were growing more unbearable and interfered with sleep. They seemed worse at night. After a short sleep in the evening and early night the pains were such that he was obliged to sit up, taking "cat naps," as he expressed it.

In May, five months after his first pains, the patient entered the hospital for a week to allow study of his case, to the end that a diagnosis might be made. At that time it appeared that his bowels were somewhat inclined to constipation, that he experienced flatulence, eructations, and occasional vomiting an hour after eating. It also appeared that he had lost about forty pounds. This he attributed to the disturbance of his stomach due to taking so much medicine (potassium ?), to loss of appetite and loss of sleep. His maximum weight had been 220 pounds, and his theory of the cause of loss was thought reasonable. Lavage relieved the eructations, but the pain continued, as did insomnia. A test-meal followed by Günzberg's test showed a good reaction—free hydrochloric acid. The urine was normal, and physical examination revealed nothing abnormal.

No diagnosis was recorded, but it is fair to the observers of this case to state that during this visit to the hospital the conjecture was expressed that this man would continue to lose flesh and would reappear with cancer of the stomach.

After leaving the hospital he was to continue daily lavage. For a time he had success in self-treatment—no more vomiting, only occasional lumbar pains, and persistent insomnia.

After another month, six months or more from the appearance of the first pains in the back, diarrhœa began—five or six loose movements daily —which continued to the end of life.

In the tenth month of illness (from first pains) he returned to the hospital, having lost seventy pounds, his complexion bearing the stamp of cachexia. Günzberg's test showed a faint reaction. Nothing could be felt in the epigastrium, though the abdominal walls were relaxed and depressed. Under chloroform a tumor was at once felt. It was just above the umbilicus, almost in the middle line, perhaps a little to the right, slightly movable—*i. e.*, it could be dragged a little to the right, so that the aorta could be felt pulsating at its left. The tumor did not move with respiration; was believed to be not connected with the greater curvature of the stomach, but distinctly coinciding in position with the head of the pancreas. As felt through the relaxed abdominal wall, it seemed like a cricket-ball—*i. e.*, round, sharply circumscribed, elongated.

The diagnosis of carcinoma of the head of the pancreas was made, and the patient transferred to the surgical division for exploratory operation. It may here be stated that the number and character of the passages of the patient (five to six loose motions daily) recalled to the mind of the writer some observations long since heard, that the diagnosis of pancreatic disease is sometimes aided by studying the stools. One observer claimed to have found fat floating on the stools, etc. With this thought in mind, without knowing whence it came, whether from reliable English observers (to the best of recollection) or from most unreliable sources, a systematic observation of the passages was instituted. The nurses reported that the passages were quite unusual in appearance, being gray stone-color, soft, pasty, and that accompanying them was a brownish watery fluid, like water with a little molasses dissolved in it, or like thin, brownish machine oil. Upon the surface was thought to be an oily film. These appearances varied but little, though occasionally a pulpy emulsified appearance was described. Whatever value these points should subsequently reveal, the diagnosis accompanying the patient to his operation was carcinoma involving the head of the pancreas and occluding the duct.

The reasons for considering (1) the lesion cancer were cachexia and emaciation (loss of weight, seventy pounds); and (2) the lesion not of gastric origin, were the presence of free hydrochloric acid in the gastric contents, also the further fact that the tumor did not feel freely movable; and (3) for considering the tumor a pancreatic involvement, the fact of its location, that the mass was scarcely movable, swaying a little to the right, not moving with respiration; that the soft, pasty, gray diarrhœal passages seemed to contain an excess of fat.

Exploratory operation was performed by Dr. McCosh, who described the findings as follows: A mass shaped like a very thick "pancake," involving the head or middle portion of the pancreas, including so many vessels that removal was out of the question.

The patient was returned to the medical division, when his wound had healed, for study of the fat absorption. He continued to have passages of the same appearance as before, three to five daily.

At this point we were fortunate in interesting Dr. C. A. Herter in the case, and securing his services in a careful study of the total intake and outgo of fats.

About one year from his first described pains in the back our patient was transferred to his home, an hour by train. He rapidly failed, and a month later died. Every effort to secure an autopsy failed, and the question whether the tumor occluded the pancreatic duct alone, or occluded both the pancreatic and biliary ducts, will never be answered.[1] By so much it falls short of being a classical case. The complete history of the case, then, accentuates the "second feature of especial interest in this case, viz., the locating of the disease in the head of the pancreas."

Chemical Examination of Feces and Urine by Dr. Herter.

The appearance of the stools from the patient who presented the foregoing history, having been such as to indicate the presence of a more than usual quantity of fat, it was thought desirable to make a study of the fat absorption in his case, in the hope that it might throw some light upon the relation of the retroperitoneal tumor (which was discovered under chloroform and subsequently verified by operation) to the patency of the pancreatic and biliary ducts. The chief object of the investigation was to determine how large a proportion of the fat introduced with the food was absorbed from the gastro-enteric tract, and how large a proportion was lost with the feces, it being known that the absorption of fats is apt to be greatly reduced when the pancreas is the seat of extensive disease, or when the pancreatic duct is impervious, or when the bile ducts are obstructed. The period of observation extended over seven days. During this time the patient was upon an exclusive milk diet. An accurate record was kept of the quantity of milk taken each day. A representative portion of each day's milk was set aside for the determination of the fat-content. The following table shows the facts relating to the quantity of milk and fat received daily:

Date.	Grammes of milk ingested.	Per cent. of fat, *i. e.*, ethereal extract.	Grammes of fat ingested daily.
October 29	2580	4.25	109.1
" 30	2850	3.49	90.0
" 31	2640	5.30	139.9
November 1	2640	4.45	117.5
" 2	3120	5.23	163.2
" 3	3240	4.41 (estimated)	142.9
" 4	3240	3.74	121.2
Total milk . .	20,040	Average 4.41	Total fat 883.8

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[1] It is of interest that about ten weeks after the date of this study the patient developed intense jaundice, which lasted until his death, one week later. The appearance of jaundice probably corresponds to the implication of the common bile duct by the neoplasm.

It is thus seen that the patient received 883.8 grammes of fat in the seven days of the experiment, or 126.3 grammes daily—a generous but not extreme daily allowance of fat.

During a period corresponding to the seven days in which the fat-content of the milk was determined, the total quantity of feces was saved, with a view to ascertaining, first, the quantity of fat lost by the feces during the seven-day period, and, second, the relative proportion of neutral fats, fatty acids, and soaps. Owing to an oversight, an exact separation (by charcoal) of the feces corresponding to seven-day period was not effected. The period during which the feces were saved began and ended just twenty four hours later than the period during which the food was studied. An error is thus introduced, but it is probably very small, as the diet of the patient previous to the time of the study had for some time been essentially the same as that of the seven-day period. In order to prevent the action of micro-organisms in further splitting the neutral fat into fatty acids and glycerin, the feces were placed in a saturated solution of bichloride of mercury immediately after they were passed. As first passed the feces were typical acholic movements, light gray in color, and of the consistence of a soft pomade. Microscopical examination showed numerous fatty acid crystals. The epithelial detritus was not bile-stained. The feces were studied chemically, not in one portion from the entire week's collection, but in three separate portions. The percentage results given here represent averages obtained from the three portions. The total ethereal extract of the feces for the seven days was 335.36 grammes. The total ethereal extract from the milk taken during the period was, as above stated, 883.8 grammes. The fats soluble in ether which were lost by the feces thus amount to 37.95 per cent. of the fats introduced with the milk.[1] The ethereal extract of the feces does not, however, represent the total fat of the feces. The neutral fat of the feces and its fatty acids are extracted by ether, but the soaps do not enter into solution. It was, therefore, necessary to determine the fat present in the form of soaps in the residue of the feces (after extraction by ether). This was done by decomposing the soaps, liberating their fatty acids and extracting these by means of ether. A not inconsiderable quantity of fat was recovered in this way. Thus, the total fats of the feces, including fatty acids, neutral fats, and soaps, amounted to 415.11 grammes. This is equivalent to 46.76 per cent. of the fat ingested as milk. This loss of fat in the feces is greatly in excess of that which normally occurs. Thus, Mueller[2] in three healthy adult individuals found that the percentage of fat lost by the feces was 7.2 per cent., 16.9 per cent., 10.5 per cent. Of the known causes of a largely excessive loss of fat by the feces—*i. e.*, of defective fat absorption—there are two which may be excluded in this case: First, the excessive ingestion of fat, and, second, the presence of diarrhœa.[1] There are, however, two other causes of markedly reduced fat absorption which have to be considered carefully in reference to our patient—the absence of the pancreatic juice and the absence of the bile. In his study of the feces in jaundice, Mueller found that where the bile was wholly absent from the intestine the proportion of ingested fat that reappeared with the feces varied from 55.2 to 78.5 per cent. In several of Mueller's cases it was learned by autopsy that the bile was shut off from the duodenum owing to mechanical conditions, while in the same cases the pancreas was normal in appearance and its duct pervious. These cases constitute proof that the absence of bile may be the cause of greatly decreased fat absorption. This conclusion is in perfect accord with the experimental observation of Munk, who found in dogs with biliary fistula that the fat absorption was much reduced. Whether there are ever any exceptions to this influence of the bile on fat absorption we have yet to learn.

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[1] The ethereal extract of the feces constituted 49.98 per cent. (or three portions) of the dry substance of the feces. The following percentages of fat were obtained from normal feces from different individuals: 19.98, 26.39, 11.55, 17.90, 19.95, 12.58, 13.78, 21.39, 15 32, 14.17, 16.66, and 26.55 per cent.

[2] Untersuchungen über Icterus, Zeitschrift für klinische Medicin, Bd. 12, 1887, p. 45. This is probably the most important work on fat absorption hitherto published.

The influence of the pancreatic juice on the absorption of fats is less well understood and observations are more conflicting. Walker found that the stools were clay-colored or stone-colored and fatty in two cases of diabetes in which there was no jaundice, and in which autopsy showed disease of the pancreas, but no alterations in the liver. The stools were not studied chemically in these cases. In support of the view that fat stools may result from absence of the pancreatic juice is the evidence derived from the extirpation experiments of Abelmann,[2] of Minkowski,[3] and especially of Harley.[4] These observers found a marked reduction in fat absorption after extirpation of the pancreas. Harley obtained the striking result that the fat lost by the feces equalled or even exceeded that introduced when the pancreas had been removed from dogs.[5] In opposition to these findings are those obtained by Hartsen and by Mueller. Hartsen,[6] in two diabetics with extreme atrophy of the pancreas, found no increase in the fat of the stools, though from eight to ten spoonfuls of cod-liver oil were part of the day's food. Mueller could observe no distinct increase in the fat lost by the stools in two cases of pancreatic disease (one of advanced atrophy of the pancreas, another of cystic degeneration), though the food contained a usual quantity of fat. There are also numerous experimental results in opposition to those obtained, as mentioned above, by Abelmann, Minkowski, and Harley. Whatever conclusions may ultimately be reached as the result of new observations upon the relation between the pancreatic juice and fat absorption, it seems clear that extensive pancreatic disease does not *necessarily* interfere with the absorption of fat. So far, therefore, as our case is concerned, we cannot feel sure that the reduced fat absorption is due exclusively to disease of the pancreas, although we know from the exploratory laparotomy that the head of the pancreas was extensively diseased. We are unable to say whether the defective fat absorption depends on shutting out of the pancreatic juice alone or on the absence of both bile and pancreatic juice.

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[1] In a patient suffering from acute intestinal indigestion, with repeated large pale move ments, I found that the feces contained 53.91 per cent. of ethereal extract on one occasion, and 56.43 per cent. on another. The fat content returned to normal after three days.

[2] Inaug. Dissert. Dorpat, 1890.

[3] Zur Lehre von der Fettresorption, Berlin. klin. Woch., 1890, p. 333.

[4] The Journal of Physiology, vol. xviii., 1895.

[5] The excess of fat is attributed to the presence of fat in degenerated epithelium from the gut.

[6] Quoted by Nothnagel, Erkrankungen des Darms, 1895, p. 21.

The careful studies of Mueller indicate that the pancreatic juice possesses the power of splitting the higher neutral fats into glycerin and the corresponding fatty acids. Neither the gastric juice nor the bile appears to possess this property. It was found by Mueller that in three cases of pancreatic disease the neutral fat in the stools was markedly increased—in one case it was 50.83 per cent., in another 52.3 per cent., and in a third 77.57 per cent. It seems probable that we may interpret habitual deficient fat-splitting as an indication that the pancreatic juice is deficient. In our own case the fat of the feces upon analysis yielded the following results:

	Second portion of feces.	Third portion of feces.	Average of three portions of feces.
Neutral fat . . .	17.87 per ct.	20.53 per ct.	17.50 per ct.
Fatty acids . . .	64.73 "	62.12 "	64.92 "
Soaps	17.70 "	17.35 "	17.58 "

In the three normal patients previously mentioned the neutral fats amounted to 27.88, 20.5, and 24.8 per cent. of the total fat of the feces. I have obtained similar percentages in a number of stools from normal persons.

It is thus evident that the breaking up of the neutral fats was accomplished as fully as in health. How is this to be explained on the assumption that the pancreas is the seat of extensive disease? Although we know that exclusion of the pancreatic juice from the intestine *may* occasion diminished splitting of neutral fat, there is no doubt that the breaking up of neutral fat into fatty acids and glycerin may be brought about to a considerable degree by the activity of micro-organisms. Thus, Escherich found in infants that the colon bacillus is capable of exerting such an action. In our case we have positive evidence that the bacterial activity of the intestine was more pronounced than is usual in health. Thus, it was found that the ethereal sulphates of the urine, which constitute a rough index of the extent of putrefaction of proteid substances in the intestine, were considerably increased. On October 30th the ethereal sulphates amounted to 0.484 gramme. The proportion of the ethereal or combined sulphates to the preformed sulphates on this day was 1 : 5.19. In health, on a milk diet the quantity of the ethereal sulphates in the twenty-four hours' urine from a man of average weight is generally less than 0.250 gramme. The proportion of the ethereal to the preformed sulphates (which is a more reliable index than the absolute quantity) varies from 1 : 15 to 1 : 25 on a milk diet. Again, in our case the indigo-blue of the urine, as tested by Obermeyer's solution, gave an exceptionally strong reaction on October 30th, such as is never seen in health and seldom in disease. The quantity of the indoxyl compound, the oxidation of which is the cause of the indigo-blue reaction, was shown to be unusually great in the urine collected during three of the seven days. The phenol contained in a twenty-four hours' urine amounted to 0.083 grammes. This is considerably in excess of what should be found in a patient on a milk diet, and is another indication of excessive putrefaction in the intestine. These observations collectively can only be interpreted as showing that for some reason the putrefaction of proteids in the intestine was excessive. We know through the increased indigo-blue yielded by the urine that the production of indol was excessive in our patient's intestine. I believe I have demonstrated that the chief cause of the indol production in the intestine is the activity of the common colon bacillus.[1] If, as stated by Escherich, the colon bacillus is capable of splitting fats, we seem fully justified in regarding bacterial activity as a factor in the fat splitting in the case of our patient, and it is probable that this influence is capable of fully compensating any deficiency in the fat-splitting ferment of the pancreatic juice.

It has been claimed by Pisenti,[2] that one of the consequences of shutting out the pancreatic juice from the intestine is the diminution of that proteolysis which leads ultimately to production of indol as well as other aromatic products, and to a consequent reduction of the indican of the urine. It is, however, now well understood that indol is one of the products of proteid putrefaction under the activity of the colon bacillus, and the strong indican reaction observed in the urine of our patient cannot be interpreted as inconsistent with the view that the pancreatic juice does not reach the gut.

One other feature of the feces of our patient calls for comment—the apparent absence of coloring matter. The absence of the color indicative of transformed bile pigment has usually been regarded as evidence that the bile has not entered the duodenum. Walker,[1] however, claims that light or stone-colored stools may arise as the result of pancreatic disease when the liver ducts are not implicated, and mentions two cases which seem to support the view that the pancreatic juice is as essential to the yellow or brown color of the stools as is the bile. We can hardly regard as settled the significance of stools which apparently contain no yellow or brown pigment, and it is somewhat surprising that so few accurate observations exist with reference to so important a subject. It is, however, clear, in the light of Walker's observations, that we are not safe in concluding that the bile is shut off from the duodenum simply because the stools are apparently acholic.[2]

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[1] On Certain Relations between Bacterial Activity in the Intestine and the Indican of the Urine. British Medical Journal, October, 1897.

[2] Ueber den Zusammenhang zwischen der Einwirkung des Pancreas auf die Eiweissküken und die Indicanmenge in Urine. Arch. per le Scienze med., 1887, vol. xii., No. 5.

To sum up, the study of our patient while on a milk diet shows (1) that a decidedly excessive quantity of the ingested fat was lost with the feces; in other words, that fat absorption was distinctly impaired; (2) that the fat-splitting process was accomplished as fully as in health, and (3) that the putrefaction of proteids in the intestine was excessive. The persistence of these conditions in themselves constitutes evidence that either the pancreatic juice or the bile, or both, were wholly or partially excluded from the intestine. An exploratory laparotomy showed that the pancreas was the seat of malignant disease. Therefore we may regard the condition mentioned as due to pancreatic disease rather than to disease of the liver or bile ducts, but we have no proof that the bile ducts were not also implicated, and that the bile as well as the pancreatic juice was deficient in the intestine. The fact that there was no glycosuria is not inconsistent with extreme pancreatic disease, nor was the presence of a large amount of indican in the urine. It is possible that an autopsy would have thrown additional light on the cause of the deficient fat absorption, but it must be remembered that the conditions as regards the patency of the pancreatic and bile ducts might be quickly altered by a rapidly growing neoplasm.

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[1] On the Clinical Significance of Colorless or Clay-colored Stools Unaccompanied by Jaundice, etc. Medico-Chirurgical Transactions, London, 1889, vol. lxxii. p 257.

[2] Quincke, in an instructive paper (Münchener med. Wochenschrift, 1896, p. 854) calls attention to the fact that gray-colored stools, apparently acholic, may persist for weeks, urobilin being in reality present, as can be shown by extracting the feces with acidulated alcohol. The evidence favors the view that the feces sometimes contain a chromogen derived from hydrobilirubin, which is coexistent with an acholic appearance of the stools. Unfortunately, there are as yet no observations on the fat-content of the stools under these conditions.

ON THE PRESENCE OF NEUSSER'S PERINUCLEAR BASOPHILIC GRANULES IN THE BLOOD,

AND THEIR RELATION TO THE ELIMINATION OF THE ALLOXURIC BODIES IN THE URINE.

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The observation, originally made by Neusser,[1] that under certain conditions granules may be found in the blood, which manifest a marked affinity for basic dyes and are located in immediate contact with the nuclei of leucocytes, has received comparatively little attention. This is the more surprising in view of Neusser's claim that these granules are essentially found in patients the subjects of the uric-acid diathesis, and may be regarded as pathognomonic of the disease in the widest sense of the term, viz., including gout, lithiasis, muscular rheumatism, nervous asthma, skin affections, gastro-intestinal derangements, diabetes, leucæmia, neuralgia, and neurasthenia. The only exception to this rule was noted in certain tubercular subjects, in which the granules were at times found, and which Neusser believed pursued a more favorable course than those in which the granules were absent.

Kolisch, a pupil of Neusser's, likewise regards these granules as evidence of the uric-acid diathesis.[2] But, while Neusser believes the diathesis in question to be associated with an increased elimination of uric-acid, Kolisch finds the uric acid relatively diminished, but the xanthin-bases actually increased to such an extent that the alloxuric bodies as a whole are eliminated in increased amount.

The text-books on clinical diagnosis which have since appeared make little mention of the subject. v. Jaksch[3] thus merely states that further observations will show to what extent Neusser's basophilic granules are of diagnostic interest. Cabot[4] likewise brings nothing new. The only other observations upon the subject which I have been able to find recorded in the literature come from Futcher and Fisch, in this country.

Futcher's results, however, in no way bear out the correctness of Neusser's view, and he concludes his most valuable report as follows: These observations do not in any way confirm the theory that there is a regular coincidence between an abundance of the granules and an increased excretion of the alloxuric bodies, nor do they favor the view that Neusser's granules occur exclusively in patients with an alloxuric diathesis. Cases occur in which, with numerous granules in the leucocytes, there is a relatively small amount of the alloxuric bodies eliminated in the urine, while, on the other hand, the granules may be almost entirely absent, and the alloxuric bodies be excreted in increased amount. Such directly opposed conditions may occur in different individuals having the same disease. Not infrequently the granules become increased or diminished in the same person without there being a corresponding increase or diminution in the excretion of the alloxuric bodies. In fact, increase in the number of granules may be accompanied by a diminution of the alloxuric bodies, and *vice versa*. From the information obtained one seems justified in concluding that the supposed relationship between the perinuclear basophilic granules and an alloxuric diathesis, as claimed by Kolisch, is purely empirical.[1] Fisch,[2] on the other hand, claims that in the overwhelming majority of all blood specimens examined not a trace of these bodies can be found. He believes that this fact cannot be too strongly accentuated in order to show that they are certainly something abnormal. From the experiments dealing with four persons (and from other scattered observations), he is of opinion that really abundant perinuclear granule-formation corresponds to an increased uric-acid elimination.

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[1] Neusser. Wiener klin. Wochen., 1894, vii. p. 71.

[2] Kolisch. Ibid., 1895, viii. p. 797.

[3] Clinical Diagnosis. Fourth edition.

[4] Clinical Examination of the Blood. Wm. Wood & Co., New York, 1897.

In view of the importance of the subject, and the scarcity of observations thus far recorded, it seemed necessary to repeat the work done already, and, if possible, to account for the widely divergent results obtained.

The questions which naturally suggested themselves for investigation were the following:

1. Are Neusser's granules found in the human blood under strictly normal conditions?
2. In diseased conditions, are these granules confined to the blood of patients suffering from the uric-acid diathesis?
3. Does a constant relation exist between the presence of these granules in the blood and the elimination of uric acid, xanthin-bases, or both?

Incidentally, it seemed of interest to ascertain to what extent an increased elimination of uric acid, as such, and of the alloxuric bodies as a whole, plays a part in the symptomatology of the uric-acid diathesis.

For practical purposes it was not deemed essential to place the persons to be examined in a condition of nitrogenous equilibrium, and, as a general rule, but one examination both of the blood and urine was made. The blood specimens were obtained within the same twenty-four hours as the urine. The uric acid was estimated according to Hopkins' method as modified by Whitney.[3]

One hundred c.c. of urine are treated with 30 grms. of finely-powdered and chemically pure ammonium chloride. The mixture is thoroughly shaken and set aside for from two to three hours, care being taken to stir it from time to time. It is then passed through a small filter with the aid of mild suction, and the precipitate washed two or three times with a saturated solution of ammonium chloride. With a little boiling water the salt is washed from the filter, and decomposed with 10 c.c. of a decinormal solution of hydrochloric acid. The solution is brought to the boiling-point and the excess of hydrochloric acid not used in the decomposition of the ammonium biurate retitrated with a decinormal solution of sodium hydrate, using a half per cent. alcoholic solution of dimethyl-amido-azo-benzol as an indicator. This excess is deducted from the original ten cubic centimetres. The result, multiplied by 0.0168, will indicate the amount of uric acid contained in 100 c.c. of urine.

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[1] Futcher. Bulletin of the Johns Hopkins Hospital, May, 1897.

[2] Fisch. St. Louis Medical Gazette, 1898, vol. i. p 10.

[3] Whitney. Maryland Medical Journal, 1898, vol. xxxviii. p. 334.

The xanthin-bases were estimated according to the method of Krüger-Wulff, as described in my *Clinical Diagnosis*.[1]

The blood was drawn from the finger, spread between cover-glasses, dried, fixed in absolute alcohol, stained with Neusser's modification of Ehrlich's tri-acid stain, mounted in oil of cedar, and examined with a 1-12 oil immersion lens. The stain was prepared according to Neusser's directions, and contained

Saturated aqueous solution of acid fuchsin . . .	50 c.c.
Saturated aqueous solution of orange G.	70 "
Saturated aqueous solution of methyl-green . . .	80 "
Distilled water	150 "
Absolute alcohol	80 "
Glycerin	20 "

Prepared in this manner the specific granules appear as greenish-black or entirely black little dots, which are irregularly scattered over the surface of the nucleus, as though they had been pressed out from its substance. In size they vary considerably. Specimens are thus encountered in which the granules are as fine as an ordinary neutrophilic granule, while others are much larger, and in some cases droplets may even be seen which nearly cover the entire nucleus. By a massing together of the granules, moreover, curious figures are at times formed, and it is very common to see specimens in which they form a distinct ring or star on the surface of the nucleus. Their number is likewise subject to considerable variation, some nuclei carrying only a single granule, while on others as many as twenty or even more may be counted.

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[1] This method was used by preference in order to permit of a direct comparison of my results with those obtained by Neusser, Kolisch, and Futcher. At the same time I believe, with Malfatti, that the objections made to this method by Huppert, Salkowski, and others are not altogether valid, as the precipitation of other nitrogenous constituents by sodium sulphite and copper sulphate would scarcely affect the results reached, providing that the precipitate has been thoroughly washed. It has, moreover, not been satisfactorily proved, as yet, that the xanthin-bases are completely thrown down by the silver method, and it is not at all improbable that certain xanthins may form insoluble salts with copper, and not with silver.

Contrary to Neusser's experience, I have found these granules most abundant in the polymorphonuclear elements, although they are very nearly as numerous in the small mononuclear forms. The percentage number of the latter showing granules was 86.5; that of the large mononuclear leucocytes, 40.5; of the transition forms and polymorphonuclear elements, 91.5; and of the eosinophilic leucocytes, 39.4. The largest, average, and smallest number counted in these various forms is seen below:

	Largest Number.	Average Number.	Smallest Number.
Small mononuclear leucocytes . . .	25	4.3	0
Large mononuclear leucocytes . . .	8	1.3	0
Transition forms and polymorphonuclear leucocytes	20	6.3	0
Eosinophilic leucocytes	5	1.5	0

In the first series of fifty cases, which Dr. S. P. Latané examined in my laboratory, the granules, present in every leucocyte on the cover-slip, were counted. In the subsequent cases, however, this attempt was abolished, and the granules were either recorded as absent, or present in very small, small, moderate, large, or excessive numbers, a single glance at each leucocyte being sufficient to place it in its proper category.

In order to ascertain whether or not Neusser's granules ever occur in the blood under strictly normal conditions, special precautions were taken in the selection of the subjects for examination. Only such were taken in which a negative family history as regards gout, rheumatism, lithiasis, and neurasthenia could be obtained, and in which the uric-acid coefficient was larger than one to thirty. In every case thus examined, without exception, the specific granules were found, so that the question, Do Neusser's granules occur in the blood under strictly normal conditions? can be definitely answered in the positive. My results are thus in direct accord with those reached by Futcher, who, "in a very large number of cases examined, both in healthy and diseased persons, never failed to find the granules present." So constant, indeed, is the presence of these granules in health that I feel justified in stating that their *absence* in a supposedly healthy individual may be regarded as presumptive evidence of some morbid process.

To determine the second point—*i. e.*, whether or not in diseased conditions Neusser's granules are to be found only in persons the subjects of the uric-acid diathesis—the blood of every patient occurring in my practice during the past winter was examined in this direction. It was thus found that the granules are almost as constantly present in diseased conditions as in health, and that they are not necessarily more abundant in cases of gout, lithiasis, chronic rheumatism, and neurasthenia than in other conditions. My observations are thus again in accord with those of Futcher, who says: I was able to convince myself that the granules were not more marked in the blood of patients suffering from the so-called uratic diathesis than in other diseases, or even in apparently healthy individuals.

During this series of investigations the interesting fact developed, however, that whereas under normal conditions Neusser's granules are constantly met with in the blood, they may at times be absent in disease, or present in such small numbers as to attract attention. The first cases in which this observation was made were patients with malignant disease, and it occurred to me that possibly the absence of Neusser's granules might be important from the stand-point of differential diagnosis. In this belief I was encouraged through similar observations made by Drs. G. W. Johnston and A. Stewart, of Washington, who reported that in eleven cases of malignant disease, including sarcoma of the kidney and neck, carcinoma of the uterus, stomach, rectum, œsophagus, liver, etc., no perinuclear granules were found in ten. They further state that carefully conducted experiments excluded all probable causes of error, and that the diagnosis in each case was verified by operation or the subsequent history and termination. The eleventh case, in which no perinuclear granules were discoverable, was a negress (all the rest were whites). Here a clinical diagnosis of inoperable malignant disease of the uterus was made, but the patient was lost sight of and her fate is unknown.[1]

Continued investigations, however, taught me that, whereas the granules are quite constantly absent in malignant disease, this may also occur under other pathological conditions, and I have recently observed two cases of gastric ulcer and one case of acute gonorrhœa in which the granules were likewise not to be found. Their absence is thus in no way pathognomonic of malignant disease, but the constancy with which they are missed under such conditions appears to me sufficiently important to merit attention and further investigation.

As far as the occurrence of the granules in tubercular subjects goes, I have not been able to verify Neusser's claim, though I admit that my tubercular material is small. But Futcher also says that in tuberculosis he has observed cases with abundant granules and others with few granules, without having noticed any difference in the subsequent course of the disease.

The third series of experiments was undertaken to ascertain whether or not a constant relation exists between the presence of the granules and the elimination of uric acid, xanthin-bases, or both. To this end a systematic examination of both blood and urine was made in fifty cases, many of which presented marked symptoms of the uric-acid diathesis.

A brief record of these cases follows, and the results obtained are tabulated in Table I.

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[1] The National Medical Review 1898, vol. viii. p. 78.

TABLE I.

No.	Amount.	Density.	Reaction.	Albumin.	Sugar.	Uric acid.	Urea.	Xanthins.	Alloxuric bodies.	Small mononuclear leucocytes.			Large mononuclear leucocytes.			Transition forms and polymorpho-nuclear leucocytes.			Eosinophilic leucocytes.		
	c.c.									*a* pr.ct.	*b*	*c*	*a* pr.ct.	*b*	*c*	*a* pr.ct.	*b*	*c*	*a* pr.ct.	*b*	*c*
1	1020	1.015	Acid	Trace	None	0.2785	19.38	0.4306	0.7091	100	11	7	25	2	0.5	100	20	15	100	2	2
2	1200	1.009	“	“	“	0.66	12.0	0.044	0.704	80	12	8	40	2	1	80	15	8	50	3	½
3	830	1.019	“	None	“	0.1817	11.2	0.383	0.5647	100	8	3	32	8	3	100	10	6	50	2	1
4	1160	1.019	Neutral	“	“	0.8139	15.08	0.52	1.3389	69	9	4	0	0	0	66	12	3	0	0	0
5	1140	1.016	Acid	“	“	0.0399	15.96	0.0107	0.0506	100	7	5	20	4	0.5	92	11	4	50	3	1
6	940	1.026	“	“	“	0.2876	26.32	0.413	0.7096	100	9	7	5	3	1	100	15	11	50	2	1
7	1060	1.021	“	“	“	0.4695	23.32	0.692	1.1615	100	13	6	66	5	2	78	10	4	50	1	0.5
8	860	1.027	“	“	“	0.2336	21.50	1.0791	1.3127	100	6	4	57	2	1	100	15	10	...	...	...
9	720	1.027	“	“	“	0.6408	17.28	0.2234	0.8642	60	3	1	25	1	¼	85	6	3	0	0	0
10	1320	1.019	“	Trace	“	1.1523	18.48	0.0884	1.2407	70	4	1	60	1	1	94	8	4	0	0	0
11	1140	1.010	“	“	“	0.9348	18.24	....	....	80	11	5	25	2	½	93	9	7	0	0	0
12	1420	1.022	“	“	“	0.7866	14.2	....	....	100	10	5	80	8	4	80	11	6	0	0	0
13	1230	1.016	“	None	“	0.5166	15.99	0.7083	1.2253	77	12	4	33	2	1	100	12	8	50	3	1
14	1130	1.020	“	“	“	....	......	....	....	66	8	3	50	8	2	82	8	2	0	0	0
15	1190	1.023	“	“	“	1.266	......	....	....	72	8	3	57	4	1	98	7	3	100	2	1
16	860	1.022	“	“	“	1.144	......	....	....	75	5	2	85	5	3	100	9	5	100	2	1
17	870	1.022	“	“	“	0.8744	......	....	....	100	12	4	60	7	0.5	100	12	10	50	1	1
18	1510	1.016	“	1.5 p.m.	“	0.7097	14.73	....	....	80	9	4	42	4	2	80	8	7	50	2	1
19	2476	1.015	Alkaline	None	“	2.079	22.28	....	....	100	8	3	33	3	1	100	14	6	50	3	2
20	1510	1.016	Acid	“	“	1.9787	24.16	....	....	100	8	5	33	6	2	88	8	4	50	1	½
21	950	1.018	“	“	“	0.1436	12.35	0.6664	0.8100	75	8	4	25	8	1	100	10	4	50	1	1
22	1250	1.022	“	Trace	Trace	0.945	25.0	0.0983	1.0433	100	8	3	50	3	1	100	12	6	50	3	1
23	745	1.021	“	“	None	0.7384	17.88	0.2035	0.9419	...	...	...	...	...	...	...	...	...	...	...	...
24	970	1.019	“	None	“	0.4563	14.55	0.4642	0.9205	100	6	4	6	2	1	83	6	3	50	2	1
25	2330	1.012	“	“	“	0.2740	16.47	0.5719	0.8459	65	18	1	10	4	1	80	12	10	0	0	0
26	1000	1.027	“	“	“	0.6384	20.0	0.1330	0.7714	100	10	4	23	3	2	95	14	8	0	0	0
27	1399	1.013	“	Trace	“	0.7851	10.46	....	....	...	...	...	...	...	...	...	...	...	...	...	...
28	3210	1.022	Neutral	None	Present	0.9707	40.12	0.7887	1.7594	80	8	7	80	2	1	82	9	7	0	0	0
29	715	1.015	Acid	“	None	0.3482	10.01	0.1248	0.4730	75	4	5	55	4	2	100	15	4	50	3	1
30	1080	1.023	“	“	“	0.7620	20.08	0.1923	0.9543	60	10	2	30	8	3	100	8	3	100	2	1
31	1110	1.020	“	“	“	0.4662	19.42	0.3193	0.7855	100	9	6	32	6	½	100	9	2	100	2	0.5
32	1365	1.016	“	“	“	1.054	21.84	0.0997	1.1537	78	6	2	20	5	2	86	12	10	100	3	1
33	680	1.010	“	“	“	0.1999	3.06	0.1165	0.3164	63	15	4	76	8	2	90	7	5	50	2	1
34	420	1.022	“	“	“	0.3457	9.24	0.2127	0.5584	100	10	5	5	4	1	100	9	6	0	0	0
35	1140	1.020	“	Trace	“	1.52	14.82	....	....	...	...	...	...	...	..	...	...	...	...	...	...
36	1020	1.015	“	None	“	0.5829	15.31	0.0300	0.6129	100	8	3	30	3	2	100	5	2	100	2	1

37	680	1.021	Acid	Trace	None	0.6785	15.64	0.4327	1.1112	100	7	1	25	6	1	80	8	3	50	4	1
38	975	1.022	"	None	"	0.7527	19.01	....	....	...	...	...	...	...	...	...	...	...	...	...	...
39	1330	1.015	"	"	"	0.8044	16.62	0.5568	1.3095	100	10	6	16	1	1	100	15	6	50	3	1
40	1670	1.013	"	"	"	0.8416	16.7	0.2094	1.0510	80	14	2	21	3	2	85	10	4	0	0	0
41	2470	1.006	"	"	"	1.6178	13.58	....	....	...	...	...	...	...	...	...	...	...	...	...	...
42	710	1.027	"	"	"	0.5602	17.04	0.392	0.9522	75	4	1	54	2	½	65	8	4	0	0	0
43	1640	1.012	"	"	"	0.9643	17.22	....	....	82	12	6	32	5	½	100	12	7	100	2	1
44	1165	1.021	"	"	"	1.1545	22.72	....	....	100	8	4	27	4	2	100	12	5	100	2	1
45	2020	1.012	"	"	"	2.23	28.28	....	....	60	10	3	50	7	2	80	7	4	100	3	½
46	1000	1.010	"	"	"	0.3192	5.0	0.07	0.3829	62	6	2	52	4	1	65	15	10	50	2	1
47	4160	......	"	Trace	235.9	0.4892	45.76	1.1598	1.6490	100	7	4	80	3	½	80	8	4	50	2	½
48	936	1.016	"	"	None	0.5653	20.59	0.5783	1.1436	80	16	8	6	3	2	75	8	8	50	3	½
49	760	1.027	"	None	"	2.2784	26.6	....	....	100	13	2	12	4	1	100	10	3	50	3	1
50	955	1.015	"	Trace	"	0.6060	15.6	0.2521	0.8581	75	4	2	50	5	2	100	9	6	50	2	1

a has reference to the percentage number showing granules; *b* indicates the maximum, and *c* the average number of granules in each leucocyte.

TABLE II.

No.	Diagnosis.	Urea.	Uric acid.	Uric-acid coefficient.	Xanthin bases.	Alloxuric bodies.	Alloxuric coefficient.	No.	Diagnosis.	Urea.	Uric acid.	Uric-acid coefficient.	Xanthin bases.	Alloxuric bodies.	Alloxuric coefficient.
1	Arterio-sclerosis	15.6	0.6060	1 : 25.7	0.2521	0.8581	1 : 18.1	14	Uric-acid diathesis	15.64	0.6785	1 : 11.6	0.4327	1.1112	1 : 14.0
2	Chronic gout	12.0	0.66	1 : 18.6	0.044	0.704	1 : 17.0	15	Migraine	16.7	0.8416	1 : 29.8	0.2094	1.0510	1 : 15.8
3	Chronic gout	11.2	0.1817	1 : 61.6	0.383	0.5647	1 : 19.7	16	Uric-acid diathesis	17.04	0.5602	1 : 30.4	0.392	0.9522	1 : 17.8
4	Uric-acid diathesis	21.5	0.2336	1 : 92.0	1.0791	1.3127	1 : 16.1	17	Chronic gout	17.22	0.9643	1 : 17.8			
5	Chronic gout	18.48	1.1523	1 : 16.0	0.0884	1.2407	1 : 14.8	18	Uric-acid diathesis	22.72	1.1545	1 : 19.6			
6	Chronic gout	15.99	0.5166	1 : 30.9	0.7083	1.2249	1 : 13.0	19	Migraine	19.42	0.4662	1 : 41.6	1.002	1.4682	1 : 15.2
7	Uric-acid diathesis	24.16	1.9787	1 : 12.2				20	Uric-acid diathesis	19.01	0.7527	1 : 25.2	0.2916	1.0473	1 : 18.1
8	Lithiasis	17.88	0.7384	1 : 24.2	0.2035	0.9419	1 : 18.9	21	Uric-acid diathesis	13.58	1.6178	1 : 8.3			
9	Migraine	20.0	0.6384	1 : 31.0	0.1330	0.7714	1 : 25.9	22	Lithiasis	5.0	0.3192	1 : 15.6	0.07	0.3892	1 : 12.8
10	Chronic gout	10.46	0.7851	1 : 13.3				23	Uric-acid diathesis	19.38	0.2785	1 : 69.5	0.4306	0.7091	1 : 27.3
11	Chronic gout	21.84	1.054	1 : 20.7	0.9897	1.1537	1 : 18.0	24	Lithiasis	20.59	0.5653	1 : 36.4	0.5783	1.1436	1 : 18.0
12	Migraine	3.06	0.1999	1 : 15.3	0.1165	0.3164	1 : 9.6	25	Uric-acid diathesis	26.6	2.2784	1 : 11.7			
13	Lithiasis	14.82	1.52	1 : 9.7											

Case 1.—A. J., female, aged sixty-four years. Family history of rheumatism and gout. Seven years ago was paralyzed on right side. Arterio-sclerosis well marked. A great deal of mental depression.

Case 2.—E. S., female, aged seventy-eight years. Gouty family history. Arterio-sclerosis.

Case 3.—C. W. C., male, aged fifty-six years. Gouty family history. A great sufferer from gout for many years. Tophi. Arterio-sclerosis.

Case 4.—E. O., male, aged thirty years. Gouty family history. Some uric-acid symptoms. Otherwise normal.

Case 5.—M. B. W., female, aged sixty-eight years. Rheumatism and insanity in family. Pronounced neurasthenia. Arterio-sclerosis. Epithelioma of neck. Marked anæmia.

Case 6.—E. M. S., male, aged forty-two years. Family history of gout. Chronic neurasthenia. Arterio-sclerosis.

Case 7.—J. M. G., male, aged forty years. Marked history of chronic Bright's disease on both sides of family. Influenza.

Case 8.—D. C., male, aged sixty-five years. Nothing in family history. Well-marked arterio-sclerosis. Typical uric-acid diathesis. Neurasthenia.

Case 9.—J. W. S., female, aged forty-six years. Father died of heart disease. Climacteric hysteria.

Case 10.—F. L., female, aged fifty-two years. Marked family history of gout. Chronic gout and neurasthenia. Lithiasis.

Case 11.—M. W., female, aged twenty-three years. History of gout and Bright's disease on mother's side. Father has calculous pyelitis. Chlorosis and typhoid fever, second week; temperature 101° to 103° F.

Case 12.—J. C. H., male, aged thirty-five years. Neurasthenia.

Case 13.—V. E. E., female, aged sixty-five years. Rheumatism in family. Formerly suffered a great deal with migraine. Neurasthenia. Chronic gout. Tophi. Arterio-sclerosis.

Case 14.—P. C., male, aged twenty-five years. Marked gouty history. Neurasthenia. Uric-acid diathesis.

Case 15.—W. M. L., male, aged forty years. Septic infection.

Case 16.—S. P. L., male, aged twenty-three years. Rheumatic family history. Lithiasis (?).

Case 17.—L. S., female, aged thirty-two years. Nothing in family history. Mild chlorosis.

Case 18.—F. L., male, aged forty-two years. Rheumatism and gout in family. Chronic Bright's disease, following acute nephritis.

Case 19.—M. H., male, aged (?). Amputation of foot for railroad accident.

Case 20.—T. H., male, aged fifty-eight years. Gouty ancestry. Arterio-sclerosis. Uric-acid diathesis. Neurasthenia.

Case 21.—Miss P., aged about forty years. Uric-acid diathesis. Chronic neurasthenia.

Case 22.—Mrs. B., aged sixty-six years. Father died of heart disease; mother suffered with migraine. Had migraine as a young woman. Myoma of the uterus. Four years ago was operated upon for carcinoma of the left breast. Local recurrence two months ago. Diabetes developed two years after operation. Marked obesity.

Case 23.—Male, aged fifty years. Nothing in family history. Typical lithiasis and myelitis. For many years migraine.

Case 24.—C. L. D., male, aged thirty-one years. Some rheumatism in family. Neurasthenia.

Case 25.—C. E., male, aged twenty-six years. Neurasthenia.

Case 26.—G. F. G., male, aged thirty-one years. Migraine on both father's and mother's side. Migraine during the last four years.

Case 27.—Miss McC., aged about forty years. Gouty family history. Hysteria. Tophi.

Case 28.—M. T., female, aged fifty-one years. Rheumatism and gout in family. Diabetes. Arterio-sclerosis. Tophi.

Case 29.—C. N., female, aged thirty-six years. Father died of nephritis. Migraine since childhood. Severe neurasthenia. Weight, seventy-four pounds.

Case 30.—J. M. F., male, aged thirty-six years. Uric-acid diathesis. Neurasthenia.

Case 31.—E. B., female, aged twenty-seven years. Very marked family history of migraine. Migraine since fifteen years of age. Neurasthenia.

Case 32.—Mrs. C., aged fifty-six years. Migraine in family. Migraine since childhood. Arterio-sclerosis.

Case 33.—W. L. T., female, aged forty-five years. Migraine on both sides of family. Migraine since childhood. Beginning climacteric.

Case 34.—Mrs. B., aged twenty-six years. Chlorosis and neurasthenia.

Case 35.—Mrs. H., aged forty years. History of nephritis and lithiasis. Chronic gout. Tophi. Nephrolithiasis.

Case 36.—Miss P., aged thirty years. Rheumatism in family. Neurasthenia.

Case 37.—E. B. B., male, aged forty-seven years. Nothing in family history. Rheumatism at seventeen years of age. Marked uric-acid diathesis. Much mental depression.

Case 38.—Mr. P., aged about fifty years. Uric-acid diathesis. Neurasthenia.

Case 39.—A. P., male, aged thirty-two years. Neurotic family history. Pseudo-leucæmia.

Case 40.—T. N. C., male, aged about thirty-eight years. Migraine in the family. Migraine since childhood. Some arterio-sclerosis.

Case 41.—S. E. C., male, aged thirty-two years. Neurotic family history. Neurasthenia. Uric-acid diathesis.

Case 42.—S. J. L., male, aged fifty-four years. Some rheumatism (gout?) in family. Nephrolithiasis.

Case 43.—Mrs. G., aged about forty years. Nothing in family history. Chronic gout. Tophi.

Case 44.—J. T. F., male, aged about fifty years. Nothing in family history. Uric-acid diathesis. Neurasthenia.

Case 45.—M. F., female, aged thirty-eight years. Neurotic family history. Neurasthenia.

Case 46.—J. A. L., male, aged sixty-three years. One brother died of heart disease. Nephroliathisasis. Arterial sclerosis. Heart disease.

Case 47.—Mrs. T., aged about fifty-eight years. Rheumatism in family. Diabetes. Chronic gout.

Case 48.—Mr. B., aged about fifty years. Migraine in family. Nephroliathiasis.

Case 49.—Miss C., aged forty-two years. Chronic gout. Gouty ancestry. Marked neurasthenia.

CASE 50.—H. J., female, aged sixty years. Nothing special in family. Uric-acid diathesis. Arterio-sclerosis.

From an analysis of these cases it is at once apparent that a constant relation between the presence of the granules and the elimination of uric acid or xanthin-bases does not exist. For, while in a number of instances the granules were present in large numbers, coincidently with an increased elimination of uric acid or of the xanthin-bases, or both, there were others in which but few granules occurred with an increased elimination, or many granules with a diminished elimination, of the alloxuric bodies in the urine.

My personal observations on the occurrence of Neusser's granules in the blood are thus entirely in accord with those of Futcher, and in no way bear out the claims of Neusser and Kolisch.

Experiments undertaken with a view of reconciling the difference in the results reached by different observers have thus far been unsuccessful. Whether or not Ehrlich's view,[1] who regards Neusser's granules as artefacts, and states that they are only rarely observed when strictly pure solutions made up from the crystalline dyes are used, be correct, I am not prepared to say, but am rather inclined to doubt.

In the study of the final question, which suggested itself for investigation—*i. e.*, to what extent an increased elimination of uric acid, as such, and of the alloxuric bodies as a whole, plays a part in the symptomatology of the uric acid diathesis—some difficulty was experienced in the selection of the proper subjects. This was owing to the absence of a proper definition of just what is meant by the uric-acid diathesis. Gout and liathiasis, experience has shown to be associated in some manner with an abnormal metabolism, as the result of which some of the uric acid formed within the body, or introduced from without, is retained and deposited in the joints, along the tendons, in the pelvis of the kidney and the like, where it may or may not give rise to clinical symptoms. Such cases, of course, were directly accepted. But aside from these cases there are others in which no symptoms referable to local irritation are found, but in which, associated with certain nervous and digestive symptoms, such as depression of spirits, feelings of apprehension, moodiness, irritability, a want of self-reliance, and various subjective dyspeptic manifestations, we find a scanty, high-colored urine which, upon standing, deposits an abundant sediment of uric-acid crystals. This condition constitutes what is generally spoken of as lithæmia, or uric-acid diathesis in the more limited application of the term. Such cases were, hence, likewise included, as were also those of migraine and arterio-sclerosis in which distinct improvement followed a treatment directed toward an increased elimination and diminished ingestion of uric acid and its congeners. Other conditions, which by some have also been ascribed to a uric-acid diathesis, such as muscular rheumatism, diabetes, leucæmia, etc., were excluded from investigation, as sufficient evidence has not as yet been advanced to warrant the conclusion of a causal connection existing between these diseases and the diathesis in question. The results obtained are given in Table II.

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[1] Ehrlich aud Lazarus. Die Anæmie. I. Abtheilung. Wien. A. Hoelder, 1898. p. 28.

Upon studying this table, it will be seen that an absolute increase in the elimination of uric acid is only occasionally observed, viz., in cases 5, 7, 11, 13, 14, and 18, while an increase in the coefficient *uric acid : urea*, is obtained in almost all cases. An increase in the amount of alloxuric bodies, on the other hand, is likewise not constantly met with, but it will be observed that in some cases in which a normal amount of uric acid and a normal uric-acid coefficient are encountered the alloxuric bodies as a whole may be considerably increased. This is notably the case in No. 4, in which only 0.2336 grm. of uric acid with a coefficient of 1 : 92.0 was found, while the alloxuric bodies conjointly amounted to 1.3127. The alloxuric acid coefficient, however, was found increased in all cases, so that we are forced to the conclusion that, while the uric acid occurs in relatively increased amount in the great majority of cases of the uric-acid diathesis, the alloxuric coefficient is in reality the deciding factor, and plays an important rôle in the symptomatology of this condition.

From these observations, however, it would be erroneous to conclude that we are dealing with a uratic subject whenever the alloxuric coefficient is increased, as this may occur in a great variety of diseases, which unquestionably are in no wise dependent upon such an increase. Now, as before, then, the diagnosis of the uric-uric diathesis will have to be based not only upon the finding in the clinical laboratory, but upon the subjective symptoms and physical signs as well. Whether or not cases of the diathesis ever occur in which such an increase is not observed I am not prepared to decide from personal observations, but admit that it is quite possible.

In conclusion I wish to insist upon the necessity of a quantitative estimation in the diagnosis of the uric-acid diathesis, and that not too much reliance be placed upon a simple macroscopical or microscopical examination of the urine. At times, of course, this may be sufficient, when very heavy sediments occur, but more commonly the greater portion of the uric acid is held in solution, and would escape detection altogether, unless a direct quantitative examination were made.

RETROBULBAR NEURITIS.

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There is much in the subject of retrobulbar neuritis to engage the attention and the interest of the intelligent practitioner. It is a disease, in the first place, which merits attention by the fact that our information and knowledge regarding it are still decidedly insufficient, and, indeed, we sometimes commit ourselves to a diagnosis of its presence solely on the strength of certain subjective symptoms when the patient presents to us no objective signs which would confirm our opinion.

Another important feature about retrobulbar neuritis is the marked —indeed, startling—contrast which it presents, in regard to symptoms, signs, etiology, prognosis, and treatment, with the form of neuritis with which one is more familiar in connection with nervous diseases.

A third point is that under the head of this name we group a number of diseased conditions which have, as we shall see, certain elements in common, but which differ widely in mode of origin, in cause, in appropriate treatment, in prognosis as regards life and as regards vision.

Some time ago a very interesting discussion took place at the Ophthalmological Society of the United Kingdom, introduced by a valuable paper read by Mr. Marcus Gunn, upon this very subject; but, able and instructive as both paper and discussion were, there was manifested a tendency to limit the field of view to one which, in my opinion, was too narrow for the real range of the subject.

The name of retrobulbar or retro-ocular neuritis was introduced by von Graefe to indicate such inflammatory diseases of the optic nerve as arose by continuity of tissue with other inflamed parts, or which took their origin not from alteration of intracranial pressure, but which began primarily in the optic nerve just as they might do in any other motor or (common) sensory nerve, to be followed by loss of function. Since in a certain proportion of cases no ophthalmoscopic changes were seen, it was natural to refer the seat of lesion to a portion of the nerve behind what could possibly be examined, while the occurrence in other cases of evident inflammatory alterations, followed by marked atrophy, gave one the key to their true nature, and enabled one to be confident that a stage of inflammation had been passed through, even in the cases which merely exhibited in the ophthalmoscopic picture the appearance of atrophy.

The definition of the disease suggested by Mr. Gunn, while it tends in my judgment to exclude some of the group, is certainly very valuable and will repay careful study. He says, " Rapid failure of vision, usually in one eye only, often accompanied by pain and tenderness in the neighborhood, absence of early ophthalmoscopic changes, and a tendency to recovery, are the usual prominent features." I propose to discuss these features one by one in order that we may obtain a clear idea of the disease, while at the same time I shall indicate certain facts regarding the disease which seem to me not to be strictly in accordance with Mr. Gunn's definition.

1. *Rapid Failure of Vision.* The failure of vision which occurs is of a peculiar type, inasmuch as it affects principally or solely the central region of the field. The degree of defect varies from a mere loss of definition of the outlines of objects, especially under certain particular circumstances, as we shall see immediately, to a complete though circumscribed loss of perception of light. Thus, the patient may have 6/VI of vision or absolutely none in the central area. In the less severe cases there are two methods of testing in particular which are of much practical value, viz., testing with colors and with Bjerrum's types. In regard to colors we find that the patient will display an inability to perceive accurately with that portion of his retina which is in the immediate neighborhood of the papilla and macula the tint of a small object of from 3 to 5 millimetres in diameter held at a distance of a couple of feet. Such an object held at such a distance from that part of the normal retina is quite capable of arousing a precise estimate of the color which it possesses, but not in such patients as we are now considering. The patient is made to look fixedly at a small white spot on a blackboard, while one places in the near neighborhood of the white spot, but to its outer side, a suitably sized colored spot painted on, or affixed to the end of, a black rod, when it will be found that in a moderate case blue and yellow are fairly correctly seen, while red and green are lost, and appear as yellow and white respectively. It is on account of the perception being retained of the yellow which is always mixed with our commercial reds, as well as to loss of saturation, that red is pronounced to be "yellow" or "brass-colored;" and we frequently notice, too, that a patient will call green "blue" because of the presence of blue in the green employed. It is only in rather bad cases that perception of all colors is lost at the centre; in the majority perception of blue and yellow is retained—of those colors usually which seem, by the fact of their having a larger field of visibility in normal conditions, to have a greater hold upon the retina, so to speak. That the perception of red and of green is less intense in the normal individual, is less a part of our nature, if one might use the phrase, seems also to be indicated by the fact that where congenital color-blindness is present, the probabilities are greatly in favor of its being of this type rather than of the blue-yellow type. In fact, it is only very rarely that persons have difficulty with those latter colors, confusion of which, however, is sometimes seen as a hysterical condition. It has been stated by some authorities that the periph-

ery of the fields as regards color in those patients of whom we have been speaking is apt to be restricted; from my own experience I cannot confirm this assertion, and do not consider it to be accurate.

Bjerrum's types, just mentioned, consist of a series of letters printed on a board much as the ordinary test-types are, but the contrast between the print and the background is reduced by printing the letters in dark gray upon a background of lighter gray (or *vice versa*) in place of black upon white. They may also be printed in green on a faintly green background. Thus the ability to distinguish minor degrees of contrast is tested. These types are made in various ways, but the system which seems to me best is to have the letters from the top of the board to the bottom all of one size, but the contrast between letter and surface diminishing toward the foot. It will be found on examining a patient with retrobulbar neuritis that his vision with these types is bad out of proportion to the degree of his defect with the black-on-white types; he has difficulty in perceiving differences where the contrast is slight. The patient often tells us the same facts about himself spontaneously, for he will say that he has great difficulty in recognizing the faces of his friends. We recognize faces largely by our knowledge and perception of the small differences in illumination, shade, tint, etc., arising partly from the prominence and retrocession of features, and if these are blurred and blotted, if only coarse and harsh contrasts can be appreciated, a face will not be recognized. Our patient knows the figure, perhaps the peculiar walk, of an acquaintance, but the features he cannot be sure of except close at hand.

Now, the point in regard to this failure of vision which next merits attention is the influence exerted by variations in the amount of illumination. Many of such patients may tell us (though here again, of course, they are little liable to notice the fact when one eye only is affected) that, while vision is bad during the bright hours of the day, it improves in the evening or in dull light. It is not at all probable that there is any actual improvement in the acuity of vision, at least I am not aware that any such has been proved, but at all events it is true relatively that the patient sees better in a subdued light. Why this should be is not easy to say, but it is possible that it may be due to the exhaustion by the brighter light of the affected fibres of the nerve. In this connection, too, it has been observed that vision is better after a night's rest, worse on fatigue or prolonged want of food.

The patient is apt to complain of a fog or mist before the eye, usually of but slight density; and this not in proportion to the degree of defect of vision. Thus a patient whose vision is nearly normal will complain much of this fog, while another whose vision is very much lowered will admit perception only of a delicate, luminous, perhaps faintly colored haze. Sometimes this haze moves or shimmers like the heat haze we see on looking at a landscape on a hot summer's day, or like the appearance seen on looking over the top of a burning lamp or gas-jet. This appearance is probably due to the insufficient "insulating" of the nerve fibres as a result of the inflammation, the nervous stimulation thus passing from one nerve fibre to another contiguous one.

In retrobulbar neuritis one never meets with a certain symptom present in ordinary neuritis in a considerable proportion of cases, and which was first described by Hughlings Jackson, the occurrence, namely, of temporary, almost momentary attacks of blindness.

2. The second point in Mr. Gunn's description of the disease is that the condition is *usually present in one eye only.* It may be that this is true, but the truth of the statement will depend almost completely upon whether one regards tobacco (and other toxic) amblyopia as a variety of this disease or not. It is difficult clinically to make a hard-and-fast line of distinction, and it is probable that the conditions differ rather in degree than in nature. I do not wish to discuss the matter at present; I may recur to it on another occasion. I would only say now that many points are in favor of the opinion that toxic amblyopia, if it be not actually neuritic, if there be lacking some of the real inflammatory element, is at the least so very closely allied to neuritis, and is so apt if untreated to go on to permanent alteration of tissue in a manner so similar to that brought about by a neuritis, that I for one cannot put the two conditions into separate categories as altogether distinct and non-related entities, as some do. Looking to the comparative frequency of toxic amblyopia, I can only with reservation admit that the condition is usually present in one eye only. But even leaving out of account for the meantime the cases of toxic amblyopia, it is not such a very infrequent occurrence that a patient recovers from an attack of retrobulbar neuritis in one eye only to be similarly affected in the other. I have seen this occur in a patient apparently in other respects in perfect health, except that she—a strong young woman about thirty years of age—was rather rheumatic in temperament.

3. The lesion is often accompanied by *pain and tenderness* in the neighborhood, in those cases at least in which there is inflammation of neighboring structure. It is an interesting question whether if the inflammation be limited to the nerve itself any pain will be experienced. Does the occurrence of pain not depend upon neighboring tissues and the nerve sheath being involved? We do not know whether the optic nerve has any "common" sensation or not; there are records to show that on section of it a sensation of very bright light is experienced, and there are also observations directly contradictory of this. Even if a sensation of light be experienced, that would not prove the question. Pain is but rarely complained of spontaneously in cases of retrobulbar neuritis, but the patients very often admit a sensation of weariness,

aching, or discomfort on forcibly moving the eyes in one direction—in my experience this direction is usually upward. Some have attempted to make out that there is a certain relation between the painful direction and the area of the field chiefly involved—*e. g.*, that if pain is felt on looking upward, the upper region of the field will be found to be the most seriously affected; for my part I have no evidence of the truth of this assertion, which seems to me, indeed, to be unsound, and not to be substantiated. The pain on movement is no doubt to be attributed to the tension of the sheath of the nerve (itself probably inflamed) on exaggerated movements. Pain, or at least some sense of discomfort, is apt to be experienced too when the eye is even very gently pressed back into the orbit by the fingers placed over the upper lid, but this is by no means constant and may be due solely to pressure on an inflamed periosteum. There is in some cases spontaneous complaint of a dull ache in the forehead, not amounting to pain.

4. *Absence of early ophthalmic signs* is a feature of great importance, and, since some cases run their course from beginning to end with practically no change in the aspect of the disk whatever, one ought, perhaps, rather to say that ophthalmoscopic signs are usually absent in the early stages, and may be absent altogether. However, it is more usual to find certain manifestations becoming obvious as the disease progresses. And it is most certainly true that in the great proportion of cases with which we meet, the ophthalmoscopic appearances are trifling in proportion to the alteration of vision, are very slight relatively to the gravity of the lesion as regards sight; and herein these cases form a marked and striking contrast with those of ordinary optic neuritis, for in this latter condition the ophthalmoscopic changes may be very great while vision remains perfectly unaltered as regards acuity, field, color, perception, etc., where in fact the visual symptoms are *nil*. The changes which are usually to be found in the later stages, and which may be present even in the early, are (1) slight general increase in the vascularity of the disk, which acquires a grayish-pink color, this being more marked in some districts of the nerve-head than in others; (2) fulness and tortuosity of the larger veins, which acquire a more distinctly marked double contour and light-line along with their darker color, on account of their more decided cylindrical shape and circular form in section; (3) a faint blur or haze hanging like a fine cloud or mist over the disk, suggesting an infiltration of that portion of the vitreous humor immediately overlying the nerve-head; (4) slight indistinctness and lack of definition of the margin of the disk, which fades almost imperceptibly into the surrounding fundus. Such are the signs, all nearly invariably being but slight in degree, which are most usually to be seen when first there is any manifestation; but in a certain number of cases even in the earlier stages, and in a very large number in later stages, there is on the con-

trary marked pallor of the disk, at all events, of its outer quadrant. This pallor is usually simple—that is, without any other change such as evidence of perivasculitis or of deposit in the physiological cup, or any material alteration in the calibre of the vessels, or hemorrhage in the neighboring parts of the fundus. Diminution in the size of the retinal arteries is, however, sometimes present quite early, and in most cases appears sooner or later, and there may be some blurring and disturbance of pigment about the margins of the disk, especially perhaps to the outer side.

5. The *tendency to recovery* is also an important feature in the unilateral type of retrobulbar neuritis. In the majority of such cases the prognosis is decidedly good, and one is justified in expecting distinct improvement after the lapse of a very few weeks or even not many days. This amelioration is in fact sometimes synchronous with the appearance of visible ophthalmoscopic changes, if the injection has spread down to the disk, so that we have the curious state of affairs that a patient is improving in symptoms while the signs are becoming worse. In a large proportion of the cases the recovery of vision seems to be absolutely complete, but this is a matter somewhat difficult of proof, because the final stages are apt to be slow, and patients are thus apt to be neglectful to return for examination ; they feel quite well, have returned to their ordinary habits and duties, and tend to postpone the final examination *sine die.* In a number of the "recoveries," however, it is more than probable that careful perimetric testing would elicit the existence of a small paracentral area of still deficient vision with imperfection of the color sense. All cases, too, do not recover, and in a certain percentage a decided and perhaps an absolute scotoma remains permanently. Here again we often see a marked disagreement between the signs presented and the symptoms complained of, for a patient may have optic disks almost dead-white in color, and retinal arteries small in calibre, and yet possess capital vision, or, on the other hand, good-looking disks with only a slight degree of pallor at the outer quadrant, hardly more than is often present under physiological conditions, and yet a distinct and distressing scotoma.

I pass by the subject of the microscopic appearances of retrobulbar neuritis, since so careful and able an account of these appeared so recently in this JOURNAL (September, 1897) from the hand of Dr. de Schweinitz, whose observations practically corroborate those made in the first instance by Samelsohn.

But to turn to the larger sense of the subject of retrobulbar neuritis, and to include in one view all those cases and types which I believe to be of one and the same character, though manifested somewhat differently under varying circumstances, and to include under one heading all cases with a similar "local" pathology (if the phrase may be permitted), I should divide the cases somewhat in the following manner: Retrobulbar neuritis may be unilateral or bilateral.

(*a*) A unilateral neuritis may be due:

1. To the spreading to the nerve of local inflammation.
2. To syphilis.
3. To rheumatism.
4. To gout.
5. To malaria.

It is of these unilateral cases that we have chiefly been speaking hitherto; but I fail to see any essential feature, save in the facts that they are unilateral and tend to recovery, wherein they differ from the (*b*) bilateral variety, of which I recognize the following forms:

1. Those occurring along with diseases of the spinal cord, especially locomotor ataxia and disseminated sclerosis, as well as with general paralysis of the insane.

In this class the inflammatory element may be almost completely eliminated, and the cases may be and very often are regarded as optic atrophy.

2. Those progressive cases occurring simply—that is, without any apparent relation to cord lesions, just as the ordinary type of optic atrophy occurs sometimes. It is true of this retrobulbar atrophy (for in this class also the atrophic character is the more obvious) as it is true of the ordinary optic atrophy that in a certain number of these patients spinal or head symptoms may eventually be manifested, although only after the lapse of a long time; but in a certain proportion also no such symptoms are ever displayed.

3. Cases of what has been called stationary scotomatous atrophy. This is not a good name for the condition, for one associates the idea of a progressive deterioration with the word atrophy, but there is none here, and we have a contradiction in terms. In these cases, most frequently in young persons, we find a central scotoma, usually small and generally, but not always, absolute, along with a very white and even chalky looking nerve-head, and with vessels, especially the arteries, somewhat diminished in calibre. In some of these cases there is a history pointing to a meningitis or possibly a periostitis at the apices of the orbits, or in the neighborhood of the foramina some time previously, but this is not the case in all.

4. Cases of what is known as hereditary optic atrophy. In this condition we have another instance of the unfortunate use of terms, for the disease is not primarily—as I believe—an atrophy, but a neuritis, and it certainly is not, strictly speaking, hereditary. "Leber's atrophy," as the condition is sometimes called, after the professor in Heidelberg, who has given a classical description of it, is a most interesting malady, but this is not the place to do more than merely indicate its outlines.

It is apt to manifest itself among the males of a family as they attain the age of eighteen to twenty-three years; the parents have usually been quite healthy, but several of the sons are attacked by it one after the other as the age indicated is reached. The daughters of the family (sisters of the patients) are usually quite free of the disease, but may transmit it to their sons. Both sons and daughters of the patients themselves may remain, and usually do remain, healthy, but the daughters may again transmit it to their sons; the liability usually dies out in the third generation. When women are affected by it, the amblyopia usually comes on much later in life, about the menopause, rather than in the early adult period. In the case of males the patients are usually in perfect apparent health, and no cause can be assigned for the onset of the blindness, which may come on with great rapidity, a few days sufficing practically to extinguish vision, while in a certain number of instances even more rapid loss of sight would appear to have occurred. Over the central area of the field of vision the amblyopia may be complete, perception of light even not being retained, and the only portion of the field remaining may be a mere ring around the periphery. All cases are not so bad as this, and even at the centre the scotoma may not be absolute. So far as my experience goes there is no peripheral restriction of the field. It is not always possible to distinguish between this class and that of the stationary scotomatous atrophy.

5. Without prejudice to the question of the precise condition of the nerves and their vascular supply in such cases, I think one may fairly include here the cases of toxic amblyopia, typically represented by "tobacco blindness," as coming under the same category. Whether or not there is in this condition an actual neuritis—and for my part, I think it highly improbable, for many reasons—there can be no doubt that the borderland which separates toxic amblyopia from retrobulbar neuritis and the atrophy which is so apt to follow is very narrow, and is very easily overstepped by a patient who will not take warning as to his state of health, and will not moderate his supply of tobacco, alcohol, or whatever may be his particular "indulgence."

So far as regards the treatment of retrobulbar neuritis generally, it is not necessary to say much. In the unilateral cases one must attack vigorously the vicious diathesis, whether syphilis, gout, or what not, which has led to the condition, and at the same time use derivatives and local depletion. For example, in the distinctly rheumatic cases I place most reliance on purging, salicylates, and blistering applied to the temple. At the same time one must encourage a hearty, vigorous action of skin and kidneys, by warm baths or even Turkish baths, by keeping the patient wrapped in flannel, and if needful by drugging with diuretics and diaphoretics. I believe that subcutaneous injection of pilocarpine will be found as useful in this disease as it is in persistent scleritis. Some place much faith in iodide of potassium and in mercury, even when syphilis is not present.

In the more long-standing cases, and especially in those which are more nearly allied to atrophy, strychnine is our chief reliance; but even strychnine has but little influence on the course of the disease.

It should not be forgotten that recurrence of an acute attack is rather apt to take place on exposure to conditions similar to those which brought it on before; therefore patients ought to submit for the future to regulations of diet, dress, and habits, since a second attack is more likely to leave permanent and great evil results than a first onslaught.

HEAD-NODDING AND HEAD-ROTATION USUALLY ASSOCIATED WITH NYSTAGMUS IN VERY YOUNG CHILDREN.

WITH REPORT OF TWO CASES.[1]

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Of all the functional nerve-diseases of children few are more rare and none possess greater interest than the rhythmical nodding or horizontal rotary movements of the head, commonly associated with nystagmus. Medical literature makes scant mention of these cases. Some of the books on diseases of children briefly refer to the disorder, but seem to confuse the reader by associating it with *epilepsia nutans* or *tic salaam*, which, without doubt, is a true epilepsy.

In 1851 Romberg and Henoch published the first observations of this peculiar affection that I have been able to find; later Hadden, of London, reported a series of twelve cases, and referred to similar ones; soon after he reported another series of ten cases; lastly, in 1892, Peterson, of New York, detailed five cases. Others, to whom due credit will be given, have reported cases, but the fore-mentioned observers have contributed about all that is known of this curious disorder.

In the very able address of J. Hughlings Jackson before the Ophthalmological Society of the United Kingdom, in 1889, occurs the following: "Physicians should try to help ophthalmology by bringing forward cases little likely to come under the notice of ophthalmic surgeons. Cases of spasmus nutans with nystagmus (a variety, I think, of spinal, or rather spinal system chorea, a symptomatic condition akin to canine chorea) would as 'living specimens' interest all our members." This was said eight years after Henoch's last published observations, and thirty-eight years after Romberg, Henoch, Faber, and Ebert had published cases; yet it remained for Hadden, in 1890, to differentiate clearly head-nodding from *epilepsia nutans* or *tic salaam*. And it is to his clear sight that we are indebted for the observation that "There are cases of nystagmus unassociated with head movements the nature of which is hard to explain, . . . some, at least, of these instances are, in my opinion, fundamentally the same as the class under consideration."

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[1] Read before the Ohio State Medical Society, May, 1898.

The quotation from Jackson is given not alone for the purpose of calling attention to the confusion then existing in regard to the disease, but to serve also as an apology for reporting the following cases:

CASE I.—E. G., a large, healthy appearing, breast-fed female, sixteen months old; born at term after a short normal labor of a healthy mother. The father is well but absolutely deaf from a large dose of quinine. The patient has a strong-looking brother of ten years that possesses a well-defined rhachitic rosary and bowed shins. One sister, two years older than the patient, while under my care, died of tubercular meningitis. Although the child is large and plump, the osteal epiphyses are enlarged, and a well-marked rosary is felt. The anterior fontanelle is nearly closed and twelve strong teeth have erupted. No other *stigmata* are present.

The mother says that this is the first sickness of any kind that the child has suffered. It was noticed for a week preceding my visit that she kept turning her head from right to left in a curiously rapid and regular manner, also that she appeared fretful and vomited frequently. On examination I found that the circulation and temperature were normal; tongue was coated; bowels constipated; appetite good, but without apparent cause she had vomited three or four times in the forepart of the day; to use the mother's expression, "had spewed about a yard." When questioned, the mother admitted that the child had tumbled down and bumped its head, to which she seemed to attach little importance, for she added, "that it got no more than its share of bumps."

The movements of the head were distinctly horizontal and rotary; they stopped during sleep, and were for a few seconds arrested when the attention was strikingly drawn. The sight of my watch stopped them, but in an instant they were resumed, although she continued busily looking at the dial. A sharp whistle had the same evanescent effect. The movements were singularly smooth, easy, regular, and in almost perfect rhythm, and occurred about seventy-two to eighty times a minute. The excursion began with the chin a trifle to the left of the median line and was carried horizontally to the left about 40 degrees, and then brought back to repeat the act. As before said, the movement was smooth, easy, and rhythmical, without any spasmodic or jerky elements whatever.

While observing these gyral movements of the head I discovered a rapid horizontal nystagmus of the left eye, made more distinct or increased when the eyes were directed to the left. From the notes of Dr. William Brunner, who at my instance kindly examined the eyes, I quote the following: "Examination of the eyes of E. G. shows a slight convergent strabismus; fixation with the right eye. In the left is a fine rapid horizontal nystagmus slightly more marked, perhaps, when she looks to the left. The outward movement of the left eye is probably limited to a slight extent. The nystagmus is present whether the patient has both eyes open or only the one; the pupils are equal and respond promptly to light and accommodation. The pupils were dilated with homatropine to afford a better view of the fundus, but the child was so restless that I could not get a satisfactory view of the optic nerves and only an imperfect glimpse of the rest of the fundus. No pathological condition was discovered. It is regretted that my examination does not afford more satisfactory and definite information of this most interesting case."

My unfortunate experience with the elder sister naturally led me to fear some tubercular disease of the brain, but, when the tongue cleaned and the vomiting ceased under indicated medicinal and dietetic measures, this fear subsided, and I realized that I had to do with one of those rare cases of gyral movements of the head associated with nystagmoid movements of the eyeball.

Small doses of iodide of potassium and quite large doses of bromide caused the abnormal movements of the head and eye to cease in less than six weeks. On two occasions during the last six months some slight gyral movements have been observed and at present there are times when a slight horizontal nystagmus can be demonstrated. As time advances a marked outward bow of the legs confirms the opinion that we have present an unmistakable rhachitic diathesis.

Case II.—G. L., a fair-sized male child, twenty months of age, the third son of healthy parents, born after a normal labor. The other children are quite healthy except the eldest, who was under my care about one year ago for a mild chorea.

The patient was brought into the Neurological Service at the Cleveland General Hospital in January, 1898. I found, on examination, beautifully marked gyral movements of the head, that ceased during sleep and while lying down. Placing the child in a horizontal position without support to the head, the gyrations ceased and appeared only when again placed erect. The movements were momentarily arrested when the attention was strikingly drawn; they occurred about eighty times a minute and were smoothly horizontal, constant, and rhythmical.

The eyes appeared normal and without nystagmus until the head was firmly grasped and fixed, when a fine horizontal nystagmus appeared in the right eye, and continued as long as the head was fixed, but ceased immediately when the head resumed the gyrations that promptly followed its release. No nystagmic movements could be induced by straining the sight to any angle while the child was recumbent.

Holding the head in any particular position while the child was in a recumbent posture also failed to bring out the nystagmus. The disks were normal, and no weakness or spasm of any of the eye-muscles could be demonstrated.

Although the child appeared plump, it was pale and flabby, with coated tongue, and had a history of green stools, vomiting, and other signs of gastro-intestinal disturbance. Two weeks before it had suffered a hard fall from a chair, but apart from a bruise on the scalp no other damage resulted. The fontanelles were a little slow in closing, and the eruption of teeth irregular and delayed, yet no rhachitic, luetic, strumous, or tuberculous diathesis could be defined.

It had recently recovered from whooping-cough, which was the only sickness that ever demanded the attention of a physician. The case was under observation about eight weeks, at the end of which time the movements of the head had ceased, but the nystagmus was occasionally observed. I have lost track of the case, and am unable to tell in what condition the little patient has been since the last visit to the hospital.

From these two cases a fair knowledge of this affection may be derived, but for the sake of brevity and clearness it will be well to quote the general description that Hadden gives of the disorder in his series of papers on "Head-nodding and Head-jerking in Children, Commonly Associated with Nystagmus:" " . . . characterized by nodding or lateral movements of the head, either singly or associated with one another or with movements of rotation. Further, these movements of the head may be almost constant, or may occur more especially during efforts at fixation or during excitement, always ceasing during sleep or when lying down. In most cases there is nystagmus of one or both eyes, vertical, horizontal, or rotary, often occurring simultaneously with the onset of the head-movements, but sometimes preceding them or following them. The nystagmus is much more rapid than the head movements, and has an independent rhythm; it is aggravated by attempts at fixation or by forcibly restraining the head, and may even be induced, when previously absent, by those means." The most of these cases occur in very young children. The affection is usually transient, and appears to depend upon rhachitis or some other nutritional vice that renders operative slight irritations, as dentition, gastro-intestinal disturbances, or perhaps a cerebral concussion.

It would be interesting in this connection, did space permit, to give in brief the comparatively few cases that have been reported. Study of these cases convinces the writer that no good is to be subserved by dividing the cases of head-nodding and head-shaking into separate classes, as one of these movements may replace the other, or a combination of both movements be observed in the same case.

It follows that Peterson's suggested term, gyrospasm, is not comprehensive enough to include the varieties which our present knowledge convinces us belong in the same category. The term, nodding spasm, as well as gyrospasm, is to be rejected for another reason fully as good: they are in no sense spasmodic movements, but monotonously regular, smooth, easy, and rhythmical.

These valid objections to the descriptive designations under which these cases have been hitherto reported has led me to the use of the title, "Head-nodding and Head-rotation Usually Associated with Nystagmus in Very Young Children," as a more correct description of a peculiar syndrome of the pathological basis of which we are at present ignorant.

AGE. In the majority of cases the disorder occurs between the ages of six and twelve months, although Hadden mentions one at two months, Gee one at six weeks, and Peterson one at three, four, and five months, while Henoch details its occurrence in a child of three years.

Sex. The records show a great preponderance of females attacked.

Character of the Movement. Pure movements of assent, like the nodding of " a mandarin doll," are rare; gyral movements are most frequent, although a combination or alternation of the nodding with gyral movements is common. The movements are singularly smooth, easy, regular, and rhythmical—free from the spasmodic action suggested by some of the names under which they have been described. In my first case reported the excursion of the gyral movement began near the median line and was carried well to the left. Hadden noted two cases with a like tendency, but the writer is unable to state whether the determination of the head to the side of the monocular nystagmus has any significance.

All movements stop during sleep, in the recumbent posture, and, Mills says, when the eyes are covered. I find little authority for the latter statement, although I believe it to be correct, at least in those cases associated with nystagmus. It was demonstrated in both of my cases. In both of the reported cases the movements ceased when the child was placed in a horizontal position, with or without support to the head. Although in both cases the movements stopped while the child was recumbent in bed, yet as the eyes followed any attractive object the movements of the head were almost ataxic and singularly like those of a very young child whose association movements are uneducated. If the head was grasped ever so lightly the movements ceased, and no sensation of movement was conveyed to my hands. They were arrested for a few seconds if the attention was strikingly drawn. Most observers have made the same assertion, although Mills inadvertently states to the contrary.

Nystagmus. Nystagmus may be monocular or binocular, vertical, horizontal, rotary, or mixed and alternating—one eye presenting one variety, its fellow another. Hadden says that binocular nystagmus is most common, which statement is open to question. He also states that the nystagmus may or may not correspond in direction to the movements of the head, but study of cases leads to the impression that in purely gyral movements of the head we are more apt to have a horizontal nystagmus, while the pure cases of head-nodding (which are very rare) usually exhibit vertical movements of the eye. Norrie, Henoch, and Hadden have recorded exceptions to this rule. Study of cases reveals the interesting fact that most cases of gyral movements of the head were associated with monocular nystagmus. Hadden gives one case of vertical nystagmus of the lids as well as the eyeballs. It is the only one of its kind that the literature affords.

The nystagmus is rendered more marked or, if absent, sometimes brought out by fixing the head (Case II. illustrates the latter statement); in point of time it is usually constant, aggravated by attempts at fixation, and is not modified or inhibited by change in posture. Conjugate deviation of the eyes usually accentuates the nystagmus. Gordon Norrie, of Copenhagen, alludes to a case in which a change in the character of the nystagmus took place when the eyes were turned in certain directions. My cases failed to show this phenomenon. The nystagmus usually precedes the development of the head-movements, and often persists long after the latter have disappeared, and may recur without their association.

One of Hadden's cases manifested a persistent nystagmus for one year, after which slight head-movements appeared. Case I. presents recurrence of the nystagmus during the attack of any one of the many little feverish affections of childhood.

Strabismus. One of Henoch's cases had a convergent strabismus of the right eye; Hadden reports squint to have preceded the disorder in one of his patients; Dr. Gee observed the same in one case, and it was slightly marked in one of the eyes of my first case. Recent examination shows complete recovery from squint.

Pupil. Hippus was present in Norrie's case; Hadden also observed one case. Of five cases in which Hadden made special examination of the pupils, in addition to the case of hippus mentioned, he records one case with poor pupillary action, with convergence; one where the nystagmic eye acted better consensually than with light.

Optic Disks. With the solitary exception of Hadden's case of pale disk, with a slight crescent of atrophy about the left, no changes of the fundi have been recorded.

Vision. The tender age of the reported cases has precluded investigation of the interesting question of the visual acuity. Cases have been followed for years yet no refractive or other ocular defects have been recorded. From this we would infer that vision is not necessarily at fault, notwithstanding Leszinsky's statement to the contrary.

Some of Hadden's cases had a curious way of loooking at objects: one turned its head away from the object and looked sidewise; another threw the head back and peered through half-closed eyes. This condition is not necessarily confined to this class of cases, as I have at the present time under observation a bright little boy of two years, who since birth has had a combined double lateral and rotary nystagmus with evident lack of visual power that is made manifest in many ways, but chiefly by looking sidewise with the head turned from the object.

That this peculiar phenomenon is not necessarily a result of nystagmus nor a cause thereof is shown by some notes of a case referred to me by Dr. N. S. Scott:

An hysterical spinster of twenty-nine years; clothed with the stigmata of degeneration; possessing a family history replete with dipsomania, hysteria, imbecility, and lunacy. Muscle-jerks all exaggerated; plantar reflexes absent; visual fields contracted for both form and color; slight horizontal nystagmus with extreme conjugate deviation of the eyes. She has rhythmical rotary movements of the head, and when she desires to look to the extreme right is compelled to turn the head to the left. This case has been regarded as hysterical, yet we must admit that the peculiar association of head-movements, nystagmus, and conjugate deviation of the eyes and head from the object viewed, is at least suggestive.

Relation to Epilepsy. Dr. Gunn, who examined many of Hadden's cases, suggested an alliance of these cases with epilepsy, and the latter was disposed to believe in the existence of the relation. Both of these observers witnessed a temporary abeyance of consciousness in two of the cases, neither of which, however, had a family history of convulsive disease. Out of a series of twenty-one cases observed by Hadden six yielded a family history of convulsions.

In Case III. of Hadden's the child was subject to sudden outbursts of convulsive laughter. Hadden seemed to think, as did Henoch, that these paroxysms of causeless glee were, in a way, related to epilepsy.

None of these cases have, as is the usual course of the early minor manifestations of epilepsy, gone from bad to worse or even developed a genuine case of convulsive disease. Unlike epilepsy, the tendency has been toward cure, and no case has been recorded that did not recover.

The writer believes that the facts recorded in the last paragraph dispose of the contention, which is obviously based on a paucity of observation and fact.

Exciting Causes. Henoch and other observers were quite sure that dentition was the chief exciting cause, and as the majority of the reported cases have occurred during that erethistic period of child-life, it certainly merits consideration. Hadden was disposed to recognize its claims, but broad-minded enough to confess mental reservation. Peterson's cases failed to impress him with its importance as a causative factor, and as one of his cases began at three months, one at four months, one at five, one at six, and one at seven months, we must recognize his doubt as natural and conservative. And since Hadden, Gee, and Peterson have observed cases at one and a half, two, three, four, five, and seven months, and Henoch at three years, we must confess, notwithstanding the occurrence of our cases in the period of dentition, a belief that it is best to reject dentition as anything but a predisposing cause, such as it undoubtedly is in a large number of the ailments of childhood.

Rickets and other nutritional disorders have been observed in connection with the disorder with enough frequency to merit our attention. Undoubted rickets was observed in nine cases of Hadden's series of twenty-one cases, and is markedly present in my first case. Neither

Peterson nor Henoch mentions it. Most observers have referred to gastro-intestinal irritation as a cause, and certainly my cases point to this as a factor.

Traumatism is by Hadden carefully considered and recognized, while Peterson, Hersch, and others regard it as the most potent of all exciting causes.

We must consider, before we accept these causes as *bona fide* ones, that, in the dispensaries of London, where Hadden observed his cases, rickets is the most common of all diseases of children, and that history of falls and bumps is but the daily history of childhood. Hadden reports three instances of head injury in his first series of cases; Peterson in two of his five cases; Hirsch in his single case; while in my Case I. it was doubtfully present; in the second it was undoubted. Peterson says: "Perhaps concussion of some kind may be found in most of the cases to be the determining factor—a concussion setting up, in the centres of the spinal accessory and at times in those of the oculomotor nerves, an arhythmic discharge."

PATHOLOGY. The pathology of functional diseases that possess inherent tendency to self-cure is quite sure, for time to come, to rest upon a basis of analogy rather than histological fact. And the time is also come when we no longer look to the microscope as the last and final court of appeal, for with the advent of the latest pathological science we are convinced that through the wonderful lenses we see but the ashes of perished fires. And while speculative pathology is not to be encouraged, yet the shrewd clinician is the man of all men to point the investigator to the seat of the disease. Henoch was prompt to suggest an irritation at the root of the spinal accessorius, upper spinal nerves, and motor oculi communis which demanded a nearness, of origin, of which the knowledge of that time afforded scant proof. To the comprehensive grasp of Hadden we are indebted for suggestions that, the writer believes, throw the best light on an obscure subject. "Hadden believes that the seizures point to instability of motor centres above the nuclei in the spinal cord and fourth ventricle, and he would, therefore, attribute the disorder to a functional or other disturbance of the cerebral cortex. The child has acquired certain voluntary or purposive movements of the head and eyeballs, but these have not as yet become thoroughly organized and fixed in the psycho-motor areas of the brain; hence a dissolution takes place because of the inability of the strained cortical centres to stand the work to which they have been too early subjected." (Mills.)

The writer, in considering the pathology of these cases, accepts as a fact the obvious relation of the head and eye movements; hence we have to consider an automatic head and eye-movement in a child of unstable nerve development, and at an age in which the associations of those necessary movements are being educated and fixed in the psycho-motor areas of the brain. Any one that has observed the head and eye movements of the infant cannot have failed to mark the incoördinate attempts at associated movements of the head and eyes.

The fibrous connection between the visual areas of the cerebral cortex and the fovea centralis that is necessary to perfect vision does not fully develop until after birth, and only gradually becomes medullated and fit for function. After this process is completed, which takes place only when the cortical cell has attained a degree of maturity that provides ample nutrition for its axis cylinder, then the structural and physiological integrity of the central neuron is complete. During this time the same process of development in the peripheral neuron is going on with even greater rapidity, and we have the beginning of one of the most wonderful and mysterious processes of the nervous system—the communication between the central and peripheral neuron.

Binocular adjustment, judgment of fixed objects, spatial relations, including station, are acquired by the child as the medullation progresses. If this progress of medullary development of the nerve-supply of the eyes is either interfered with by disturbance of nerve nutrition or rendered functionally imperfect through early acquired opacity of the refracting media, or by congenital absence of a place in the retina that has more acute and perfect vision than elsewhere (fovea centralis), or a congenital defect in the receptive centre in the cortex, or an exhaustion of any of that delicate apparatus, then we are liable to get a rapid to-and-fro movement of the eyes—*nystagmus.*

Notwithstanding the statement of Leszinsky, the majority of these children have not defective vision, but develop nystagmus as a result of either cortical exhaustion or a disturbance of the conducting powers of the fibres; hence all of the impulses sent from the cortical cells to the muscles are either too feeble to reach their destination or are blocked by imperfections of the transmitting tracts, and we have a real corto-ocular paralysis agitans.

When we consider that a severe concussion may so disturb the cortical cells of a healthy adult as to produce a rapid though transient nystagmus, we cannot logically reject traumatism as an excitant of a more wide-spread and permanent, though like, condition in the unformed nervous structures of the infant.

If the relation that the ordinary head-wagging of the child with congenital nystagmus and that of paralysis agitans is due either to cortical exhaustion or to disease or defects in the medullation of the conducting fibres, we need not puzzle ourselves unduly over the association of the automatic movements of the head and eyes of infants as described in this paper. For in any child having the constant irritation of rhachitis and other nutritional disorders; of an unstable, unformed nervous system, spurred to its full capacity by the untiring energy of childhood, is it a wonder that cortex and conducting paths become exhausted and take on such erethistic sensibility that any slight excitation—indigestion, fright, or a slight concussion—may set up irritative discharge of automatic nerve force that finds expression in the monotonous movements of the head and nystagmic twitching of the eyes, simply because they represent the highest development of the acquired association movements that the child is busily educating for the proper preservation of the highest type of animal life.

Diagnosis. The question of diagnosis is one of examination. Study of the reported cases, along with my own limited experience, convinces me that the imperative movements of the mentally defective and imbecile are easily differentiated. The spasmodic twitchings of epilepsy, the incoördinate, jerky, purposive movements of habit-spasm and chorea, essentially differ from the monotonously smooth nodding and gyral motions that are characteristic of the disorder under consideration. The peculiar head wagging noticed and admired as cute and pretty in precocious children when intensely interested, approaches the disease and indicates an actual strain of the association tracts. The wabbly, rolling heads of children with congenital nystagmus, vainly trying to fix head and eyes by the aid of a poorly endowed visual centre, either at the retinal or cortical end of a very complex and delicate connecting tract, bear some resemblance that the history alone will dissipate. The "head-banging" of Gee, in which young children turn on their faces during sleep and bang the face into the pillow a number of times; and "head-knocking," which in London is so often seen as a symptom of rickets in very young children, in which the little one seems earnestly happy while knocking its head with considerable force against some hard substance, are so totally unlike the preceding cases that one who has read carefully the accurate description of Gee and Hadden cannot fail to make a correct diagnosis.

Prognosis. The prognosis as regards life is good: no fatal case has been reported. Most cases tend to spontaneous cure in six weeks to three months, but many cases have a tendency to relapse if the child suffers any disturbance of health. Hadden observed one case that remained well for a period of two and a half years, and Gee's first case was found to be well and strong at the age of twelve years. While Hadden observed some slight mental deterioration, he was of the opinion that it would not persist.

Treatment. The treatment that has seemed to expedite recovery is in itself an argument in support of the cortical exhaustion theory: nerve rest by bromides; rest and increased nutrition of the brain by the recumbent posture. If the child is cachectic study the cause and remove it, be it struma, lues, tuberculosis, or rhachitis. Quite a percentage of the cases seem to have rhachitis, and unless this condition is carefully sought, and treated by diet, phosphorus, and lime, you will not have done your whole duty. Most painstaking and thorough should be your investigation of the digestive system and correction of all its errors. Judicious warnings should be given to parents of precocious children, urging them to forbear the exhibition of the unnatural brightness of the tender little minds, and to protect them from traumatism, as these children seem to be prone to fall, because, as I believe, they are slow to acquire spatial and postural judgment.

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EXTERNAL URETHROTOMY.[1]

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EXTERNAL urethrotomy for the relief of stricture is an operation so frequently performed by the members of this Association that it is with some hesitation I bring it before them for their consideration and discussion.

My object in so doing is not to advance new or original methods, but rather to accentuate certain points in the technique of the operation and the after-treatment of the case, which in my hands have given better and more permanent results than are frequently encountered following this operative procedure. Such conditions as recontraction of the stricture, perineal abscess, or fistula, and uncured urethro-cystitis are not uncommon, being due partially to the patient's ignorance or neglect, and partially to faulty operative and post-operative procedures, and can in a great measure be avoided if the following points are carefully carried out.

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[1] Read before the American Association of Genito-Urinary Surgeons, West Point, June 7, 1898.

DIVISION OF THE STRICTURE. The patient having been properly prepared and placed, the urethra is opened on its floor by a single clean incision and all of the stricture tissue completely divided in the median line, not only on the floor, but also on the *roof* of the canal; this latter procedure I am convinced is not invariably carried out, as in many of these cases which I have personally examined, on endeavoring to pass a sound some time after the operation (in one case as early as the second week, in two cases at the end of the fourth week, and others at longer intervals) a mass of indurated tissue could be distinctly felt projecting from the roof of the canal, to pass over and, if possible, beyond which, the tip of the instrument had to be forcibly depressed toward the perineum; this mass I take to be uncut stricture-tissue, or if it was divided at the time of the operation, this was not completely done, or was not followed by proper local measures. It is claimed by some that cutting on the roof of the canal in this region is liable to cause severe hemorrhage; this accident, if it occurs, is due, I think, to over-zealous cutting, with a view to subsequently passing unnecessarily large sounds. In over eighty of these cases I have not had any hemorrhage either at or after the operation. In order to ascertain if all of the stricture tissue has been completely divided the index-finger, with the palmar surface directed upward, should be passed into the perineal wound and down to healthy urethra, well in front of the stricture, and then backward on the roof of the canal into the bladder, as on its way it readily detects any bands or masses that have not been thoroughly divided; whereas, if a sound passed from the meatus be alone relied on, it will usually enter the bladder with ease, as the floor of the urethra, being cut away, allows the convexity of the instrument to bulge down and out and the tip to slip over the obstruction on the roof, thus giving the operator a faulty idea as to the real condition of the canal. The dilatation of the posterior urethra by the index-finger passed into the bladder, prevents in a great measure post-operative tenesmus, as in the majority of these cases this portion of the canal is found to be so rigid, firm, and contracted that it often requires several minutes to overcome this condition and restore its normal patulousness; in other words, we over-dilate and paralyze the contracted prostatic fibres, and in this way prevent their physiological action for some time, thus giving the gland and bladder much-needed rest and reducing their inflamed and congested condition. The perineal operation being completed, a full-sized sound should be passed from the meatus into the bladder, to ascertain that the whole length of the urethra is clear; if obstructions exist, they may be removed by meatotomy, internal urethrotomy, or post-operative dilatation.

Bladder Drainage. Bladder drainage after these operations is a most important factor, and seems, judging from the literature and the work of different operators, to be as yet an unsettled question, both as regards the best method of, and proper time for, the retention of the drain, some advising the use of a silver or soft-rubber catheter, draining through the urethra; others gauze drainage through the wound; some no drainage at all, and still others a large perineal tube, which latter method is in my experience far the best, if properly employed, as it keeps the bladder well drained, dilates the posterior urethra and, to a certain extent, the divided stricture, and is an ever-ready route for bladder irrigations, which are so essential in the treatment of the urethro-cystitis which so often exists in these cases, and which, strange to say, is so frequently ignored or overlooked. A large soft-rubber perineal tube is selected and introduced into the bladder just far enough to allow the urine to drain freely. This position is accurately ascertained at the time of the operation by irrigating the bladder through the tube and noting the amount and force of the outflow as the tube is slowly withdrawn. The tube is then secured in place by a heavy silk suture passed directly through it and both edges of the wound, which is then lightly packed with gauze, and the suture tied, thus preventing the tube from slipping either in or out; the bladder is then irrigated and partially filled with warm boric acid or salt solution and the tube clamped until the patient is put to bed, when it is attached to the usual siphon apparatus. The receptacle for the urine should be placed somewhat lower than the bladder, but not too low, as the suction then becomes quite strong and causes some patients painful sensations in the bladder, with, perhaps, tenesmus.

In from two to four days after the operation the tube is taken out, washed, and replaced; it is removed permanently on the fifth to the seventh day, and the patient is allowed to be up and about and passing his urine both by the urethra and the perineal incision, pressing a pad of gauze against the wound as he does so. In the majority of cases all of the urine is passed by the urethra in about one week after the removal of the tube, but in some the urethral wound remains patulous for several weeks. This usually occurs in cases in which the perineal wound has not received proper treatment, and when no sounds have been passed either at or after the operation; also in alcoholic or debilitated subjects, and in cases in which the urethra has been extensively cut for the cure of urinary fistulæ and sinuses.

Post-operative Dilatation. When the tube is first taken out, on the second or the fourth day, for cleaning, a medium-sized sound is passed to the bladder and held there for about a minute; this is repeated regularly every second or third day, until the perineal wound is cicatrized, and the urethra taking a No. 28 to 30 French with ease, according to the case, when the intervals are made longer. It is surprising to note how little pain the passage of the first sound causes, provided it be warm, well lubricated, and introduced slowly, with its tip hugging the roof of the canal. After the sound is removed the tube is replaced and the bladder and urethra are gently irrigated with hot boric acid or salt solution, and on the alternate days, if indicated, with mild solutions of permanganate of potassium or nitrate of silver.

TREATMENT OF THE PERINEAL WOUND. The perineal wound should be personally inspected every day to see that it is healing solidly from the bottom by firm, healthy granulations, and not allowed to bridge over in places or fill up with pale, flabby tissue. This can be prevented by running the finger firmly, but gently, through the bottom of the wound from end to end, the patient lying on his abdomen, or in the lithotomy position, with thighs widely separated, and in a good light; exuberant granulations are removed by the nitrate of silver stick or curved scissors, and the wound dressed lightly with gauze. When the perineal wound is cicatrized, the urethra taking a full-sized sound with ease and the urethro-cystitis improving, the patient must be made to understand clearly that the operation has not cured his stricture, but merely divided it, and that he must continue to have sounds passed at long intervals for the remainder of his life; also that he must not stop bladder or urethral medication until urination is normal and the urine practically free from tissue elements.

The following cases, briefly detailed, have been selected from my records, as they show results dating from two years to two years and a half after operation, and may therefore be considered of value. Many similar cases could have been given, but these were deemed sufficient to illustrate the above points. In one case the stricture was traumatic, in the others gonorrhœal in origin, one patient having three well-marked contractions. The operations performed included those of Gouley, Wheelhouse, and a combined internal and external urethrotomy.

CASE I.—Patient aged forty years. One gonorrhœal stricture at bulbo-membranous junction, impassable to instruments. Severe urethro-cystitis. Wheelhouse operation. Fourth day: Perineal tube taken out, cleaned, and replaced, and a No. 25 French sound passed. Fifth day: Tube removed permanently. Seventh day: All urine passed by the urethra. Patient up and about. Fourteenth day: Wound cicatrized. Examination of this patient two and one-half years after the operation shows the urine to be clear, with a few light, floating mucous flakes, the urethra soft and taking a No. 28 French sound with ease. Urination is normal.

CASE II.—Patient aged thirty-two years. One gonorrhœal stricture in the bulbous urethra, admitting a filiform. Severe urethro-cystitis.

Gouley's operation. Fifth day: Tube taken out permanently, and a No. 25 French sound passed. Patient up and about. Ninth day: All urine passed by the urethra. Fourteenth day: Wound cicatrized. Two and one-half years after operation this patient takes a No. 30 French sound with ease, urination is normal, and the urine practically clear.

CASE III.—Patient aged forty-five years. One traumatic stricture, admitting a filiform, at bulbo-membranous junction. Ammoniacal cystitis. Gouley's operation. Second day: Tube taken out, washed and replaced, and a No. 28 French sound passed. Fifth day: Tube removed permanently. Patient up. Tenth day: All urine passed by urethra. Sixteenth day: Wound cicatrized. Two years after the operation this patient takes a No. 30 French sound with ease, urinates normally, and his urine is clear, with a few light flakes.

CASE IV.—Patient aged twenty-three years. Three dense gonorrhœal strictures; two in pendulous urethra, admitting Nos. 15 and 17 French, respectively, and one in bulbous urethra, taking a filiform. Very severe urethro-cystitis. Internal and external urethrotomy. Third day: Tube taken out, washed, and replaced, and a No. 27 French sound passed. Fifth day: Tube removed permanently. Seventh day: All urine passed by urethra. Patient up and about. Fifteenth day: Wound cicatrized. Two years after operation patient takes a No. 30 French sound with ease, his urine is clear, and urination normal.

A REPORT ON SIX CASES IN WHICH THE BACILLUS AËROGENES CAPSULATUS WAS ISOLATED.

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THE occurrence of gas in the living tissues and the presence of gas after death in larger and smaller bubbles in the viscera, especially in the liver, has long been known, and the cause and significance variously interpreted by clinicians and pathologists. The appearance of the viscera when riddled with gas-bubbles is so striking and peculiar that they are described by the Germans as "schaumorgane," foam-organs. In some instances air embolism was held accountable for the condition, especially when occurring after surgical operations or after childbirth. It was suspected by others that anaërobic bacilli, wandering out of the intestinal canal after death, give rise to the gas productions. It was thus held to be a form of post-mortem decomposition, and little attention was directed to it until the appearance of an article by Welch and Nuttall in 1892.[1]

With the anaërobic bacillus, which they isolated in pure culture from the organs of their case and which they described and named the bacillus aërogenes capsulatus, they were able to reproduce in the tissues of dead rabbits, after distribution of the bacilli through the circulation *intra vitam*, a complete picture of the so-called "schaumorgane" of the Germans. The causal relation between this condition and the bacillus was thus thoroughly established. Animal experimentation further convinced them that to produce such a general and extensive emphysema of the organs and tissues as was present in their case it was necessary to inject the bacilli during the continuance of the circulation, injection into the bloodvessels after death being followed only by an emphysema along the direct course of the vessels inoculated. This noteworthy fact, and the appearance of necrosis and degeneration in the tissues around the masses of bacilli and gas-cysts in the organs of their case, led them to suppose that a terminal infection with the bacillus had taken place. Except in its application to a very limited class of cases, the old views concerning the air-embolism were thus destroyed at one stroke. Too great credit cannot be attached to the authors of this article, as it has removed a piece of mediævalism concerning air-embolism from the minds of the medical profession.

To Eug. Fraenkel[2] belongs the credit of bringing out the causal relation between the bacillus phlegmones emphysematosæ and gaseous phlegmons. This bacillus is considered by Welch as identical with his bacillus aërogenes capsulatus. To the classical description of the morphology and cultural characteristics of the bacillus little of importance has since been added, except the discovery of the formation of spores on blood-serum by Dunham.[3]

Since the publication of Welch and Nuttall's preliminary study, and the study of Fraenkel on the bacillus aërogenes capsulatus, many instances of its occurrence have been described. A partial summary of the cases published previous to the year 1896, with further studies on the bacillus aërogenes capsulatus, is to be found in a second paper, not yet completed, by Welch and Flexner,[4] published in the *Journal of Experimental Medicine*, 1896. The association of a well-defined bacterium with the ante-mortem or post-mortem development of gas in the body is now well established, and a large number of illustrative cases is at our disposal, so that the record of new instances of the isolation of the bacilli aërogenes capsulatus would be itself of but moderate value. However, the conditions under which infection with the germ occurs, its full significance either as a primary or concurrent infection, and the relative frequency with which its presence is simply a post-mortem incident, offer such a series of unsolved problems as makes still desirable an increased number of examinations and records of experiments.

The intention of this paper is to give briefly the more important clinical data obtainable in the histories of six new cases examined by the writer, with the bacteriological analyses, microscopical lesions, etc. At the end of the description of each case a brief summary of the cases in the literature having a direct bearing on the new cases will be given, special stress being laid upon the cases which have been described since those summarized in the later more elaborate publication of Welch and Flexner.[4]

The morphology and cultural characteristics of the bacillus isolated from our cases were identical, and, as they resemble exactly the description given by Welch, need only be briefly mentioned. Size of the bacillus is very variable, in general between 2 and 8 microns. Smears made from animal tissue reveal a marked tendency of the bacillus to occur as diplo-bacilli, a thin band of protoplasm occasionally connecting the rods. Long threads have exceptionally been met in preparations from gaseous phlegmons, but these threads have not been seen in the human blood or in preparations made from organs. Grown in artificial cultures, the rods appear thinner and attain a greater length. Stained by Gram's method, the bacilli appear thicker than when stained by Loeffler's solution.

Capsules were best demonstrated by the method recommended by Welch and Nuttall—that is, by fixing with moderate heat, glacial acetic acid being poured on the cover-glasses and replaced by strong aqueous solutions of gentian violet, and mounting in this fluid. The bacilli then appear even broader than when stained by Gram. By this method the capsules were always successfully demonstrated, and appear to have about the same breadth as the rod itself, and the tendency to form square ends is well made out. The protoplasm of the rod, stainable by this method, may be collected at one end of a slightly-tinged mass, the capsule, the rest of the rod being unstained, or both capsule and rod are short, as if cut off sharply at both ends, or again only the ends of the rod are tangible. Shadows are not infrequent, corresponding in size to the breadth of the rod plus the capsule. Welch,[5] in his article in the *Johns Hopkins Bulletin* on the pneumococcus, mentions similar forms for the pneumococcus, and regards them as empty capsules or involution forms. By Loeffler's stain the bacilli stain irregularly. The granular appearance is most marked in specimens obtained from gaseous phlegmons, with a tendency to heal, or where suppuration is present. The bacilli then appear longer, thinner, and are often vacuolated and with irregular borders. By Gram's stain the bacilli retain the stain uniformly, but occasionally a rod decolorizes. Decolorization of the bacilli grown in artificial cultures is more apt to occur. Where the capsules developed on artificial media the bacilli then did not differ in appearance from those occurring in animal fluids. In cultures few involution-forms were met. Grape-sugar gelatin tubes kept for three months, and then examined, showed the bacilli shrunken and thinner. My observations regarding this point are, however, too limited to be of value. Long threads extending nearly the whole length of the field (homogeneous immersion 1-12 Leitz) were met in agar cultures, often markedly curved. But few cultures showed curved rods.

In my cases except that of the gaseous emphysema of the thigh large oval cocci without capsules were met, but were never recovered by culture. Ernst and Kronig have also met similar forms. No indication of the formation of spores was ever noted. The bacillus isolated from the case of hemorrhagic pancreatitis gave an abundant growth on blood-serum; no spores were seen on smears made from this growth, and inoculations from these tubes at various intervals of time failed to give a growth on transplanting. After four days' anaërobic growth the tubes were kept exposed to the air of the room. Perhaps spores are only obtained after complete exhaustion of the media in a hydrogen atmosphere.

Most of the cultures on sugar-agar stabs were incapable of transplantation after a week's exposure to the air. The longest time noted was sixteen days. Cultures capable of transplantation, when inoculated in large amounts, were often without pathogenic power. Unfortunately, none of my cultures was kept in the hydrogen jars for any length of time. A marked feature of the growth of this bacillus in grape-sugar agar was, that the older the generation the less abundant was the gas formation, the growth never being so active as in the first few generations. Coincident with the decrease of activity in growth was the total loss of pathogenicity toward guinea-pigs.

Welch and Nuttall[1] remark "that there were curious and not readily explainable differences in the vitality of the cultures, some being still alive which were under apparently the same conditions and of the same age as those which proved to be dead." This statement was fully confirmed, and no explanation is offered. Plates made from the liver of my third case, containing enormous numbers of bacilli, as revealed by smears, refused to develop but a single colony, whereas the plates of the intestines, using the same media and placed in the same hydrogen jar, were overcrowded. This incident was not an exceptional one.

Description of the Colonies, and Cultural Characteristics. The colonies, when overcrowded on sugar-agar pour-plates, are small, very dark, granular, and have branching projections; gas is almost always present.

The deep colonies, when less crowded, have a slightly yellowish tinge, and when seen by transmitted light after two days' growth appear rather large. They are mostly ovate or elliptical, opaque, and have a purplish tint; the edge is, for the most part, sharply defined and regular, but sometimes shows a fluted border, distinctly granular along the periphery. When the colonies reach the surface the growth spreads more or less evenly. The centre of the colonies is dark and is apt to be opaque, color shading off to a pale brown. The translucent and transparent portions of the colonies show a distinctly wavy, linear, and granular texture. The edge, in many cases, is pale, very regular, and sharply defined; in other colonies single bacilli or chains of bacilli may be seen extending from the periphery of the colony, and clumps of numerous isolated bacilli, forming whitish streaks of growth, are met frequently on the bottom of the plates. Superficial colonies occasionally have a marked silky appearance.

The bacillus grows well in all the ordinary media.

In bouillon marked turbidity and a whitish deposit soon form, fluid settling and becoming clear after four days of growth.

On slant glycerin-agar growth occurs in the form of well-isolated colonies, the largest several millimetres in diameter. Colonies are whitish, show little tendency to become confluent, and the larger colonies have a slightly yellowish centre. With a Leitz three lens the individual rods on the edges are easily made out.

No growth was obtained on slanted coagulated egg albumin.

On potato, marked gas formation. Surface is wet; growth invisible, or in shape of slightly-yellowish colonies, or a thin whitish film spreads over the whole surface of potato. Condensation water is turbid and frothy. A very persistent stale-glue smell is observed on all the tubes. This odor is noticed on the hands after examination of the tubes, even before removal of the cotton plugs.

Milk coagulates on or before forty-eight hours' growth at 37° C. The coagulum, pierced by air-bubbles, floats on the surface of a clear serum, which is very acid. Coagulæ of smaller size adhere to the sides and bottom of the tubes. On shaking, clot sinks to the bottom. The growth is very characteristic.

Abundant growth in semi-fluid hydrocele fluid, with marked gas formation. No odor of putrefaction and no spore formation observed.

Two per cent. grape-sugar gelatin tubes, inoculated while fluid, allowed to cool and kept at room temperature, show numerous colonies, well isolated, appearing an inch below the surface. They increase in size toward the bottom of the tubes, where they attain a diameter of 3 to 4 mm. Gas is developed first on the third day, and becomes marked on the fifth.

Stab-gelatin tubes develop growth only along lower half of the puncture. Tubes after three to four months show slight signs of liquefaction. No spores observed. Sugar-agar tubes inoculated when fluid show a very marked development of gas.

On slant-lactose litmus agar-tubes there is a marked production of acid, with discrete colonies having reddish centres. Discoloration is prompt, complete usually after four days of growth. Gas is always found in the agar under the surface. On exposure to air the medium become reddish in a few minutes. No indol formation in Dunham's solution.

CASE I.—*Placenta Prævia Marginalis.* Post-mortem invasion by the gas bacillus. Housewife, multiparæ, admitted to the Sloane Maternity Hospital, November 16, 1896.

History. On October 25th patient lost about a pint of blood suddenly, and went to bed, where she remained. No further hemorrhage until November 8th, when slight bleeding occurred, and since then a little blood was lost each day. On admission patient was found to be close to full term. Child of good size, fœtal heart good. Cervix soft, admitted almost two fingers. Vaginal secretion abundant. Small lobes at the edge of the placenta could be felt, marginally at the left and anteriorly, the vertex being felt through the membranes on the right. No bleeding occurred from time of admission until delivery. Patient was apparently in good condition. Pulse, however, was not strong, and woman showed signs of blood loss. Podalic version, prolapse of cord, and extraction of child. Podalic version in two minutes from L. O. A. to R. S. A. easily accomplished. Membranes were then ruptured with intention of pulling foot through the cervix and leaving the patient to expel the child slowly. Very little hemorrhage (10 or 11 ounces) occurred during version, rupture of membranes. When finger sought anterior foot, it was found that child was riding on cord, which was inserted on the margin of the placenta. An attempt to dislodge the cord only resulted in its prolapse. Cord was pushed up as high as possible. A leg was pulled through the cervix. Ten minutes later, as child's heart was feeble, traction on both feet was employed and child was delivered in six minutes. Child was found to be asphyxiated. At the end of nine minutes placenta was expressed on account of hemorrhage. Not more than a pint of blood was lost in third stage. After a vaginal douche, 1–5000 $HgCl_2$ at 116° F., no more bleeding occurred. Laceration of right side of cervix extending into right fornix. Patient went into a condition of shock. Two and a half hours after delivery a hot saline infusion was given—Oiij in median cephalic vein. Three and a half hours later another infusion was given and patient vomited a large amount of fluid. Not more than 4 ounces of blood was reported as lost since delivery; half an hour later another infusion was given. At 8.15, half an hour later, woman was examined, and about 10 ounces of blood-clot removed from vagina. No rupture of uterus was made out, and the organ was found well contracted. Uterus and vagina were then packed with sterile gauze. Death at 9.30, five hours after delivery. Cause of death seemed to be shock due to rapid extraction, as the amount of blood lost was not more than 30–32 ounces. Child remained alive.

Autopsy by Dr. Ewing, twenty-four hours post mortem. Body that of a large fat woman, distinctly anæmic, no œdema. The right broad ligament and the tissues of the right pelvic region around kidney in mesocolon and over a considerable area of the mesentery are very emphysematous and infiltrated with fresh clotted blood. Peritoneal surfaces intact. A large irregular laceration is found involving the entire right portion of the os, extending from one to one and a half inches above the internal os, completely through the uterine wall and into the tissues of the broad ligament. Below it extended one inch into the vagina. Tissues of the uterus are flabby, otherwise normal. Two small hemorrhages are present in posterior wall of bladder. Firm adhesions over both lungs, which are moderately congested and œdematous. Heart chambers empty and flaccid. Beneath the endocardium are seen minute air-bubbles. Valves normal; slight atheroma of aorta. Spleen extremely flabby and emphysematous. The liver is flabby and very pale. The surface is dotted with larger and smaller air-vesicles which extend below the surface, and similar air-vesicles are present throughout the organ. Inferior vena cava and hepatic veins are distended with frothy fluid.

Kidneys flabby, capsule free, surface smooth, except for a few medium-sized air-bubbles. In places there are areas filled with fluid resembling pus. There is a marked diminution in the amount of blood in the body. The blood which exudes from the veins at site of infusion contains no gas.

Anatomical Diagnosis. Rupture of uterus, acute anæmia, pulmonary œdema.

Smears from the liver, spleen, and uterus show large bacilli, apparently in pure culture. Capsules could be stained only by Welch's method.

Pour-plates, with dilutions, were made from the liver, spleen, and uterus on sugar-agar and grown in anaërobic jars at 37° C. The original plate of the liver shows several large air-bubbles, and, examined with a low power, it is seen to be overcrowded with numerous black colonies with branching processes. Colonies seem to be of one kind. Dilution-plates present pure cultures of the bacillus aërogenes capsulatus. The plates from the uterus and spleen reveal similar colonies.

Animal Inoculations. A guinea-pig inoculated subcutaneously in abdomen with 1 c.c. of bouillon in which a bit of the liver had been crushed develops a large fluctuating swelling, which breaks through the skin, with escape of a hemorrhagic fluid. Animal dies in four days, much emaciated. On section, hair with epidermis peels off readily. Whitish necrotic masses of tissue are found over the whole of the abdomen and thorax. Smears reveal typical large bacilli, retaining Gram's stain; also numerous smaller rods which do not accept the stain. Microscopic examination of the organs was negative.

A guinea-pig inoculated with 0.8 c.c. of the hemorrhagic fluid of the phlegmon develops promptly a swelling, which breaks through the skin three days later, with escape of hemorrhagic fluid. After ten days the front of abdomen and thorax has been converted into a suppurative and bleeding area. Animal dies in three weeks, much emaciated. On section, organs macroscopically appear normal, and cultures from heart's blood, aërobic and anaërobic, remain sterile.

A third guinea-pig inoculated subcutaneously with 0.2 c.c. of the same hemorrhagic fluid develops no local effects, and remains alive.

A rabbit was inoculated intravenously with 1 c.c. of a sugar-bouillon culture, grown for three days in a hydrogen atmosphere; it was killed a few minutes later, and its body placed for twenty-two hours at 37° C. On removal, body is found tremendously swollen, crepitation is everywhere present. On section, the subcutaneous tissues and all the organs are emphysematous. Smears reveal the presence of large capsulated bacilli.

A second rabbit was inoculated with the same culture, but kept at room temperature. On section, no emphysema or gas in any of the tissues or organs; marked post-mortem softening. Smears made from the heart's blood reveal a few large bacilli; cultures remain sterile.

A third rabbit was inoculated intravenously with a pure culture, twenty-four hours old, representing a third generation, killed at once and placed at 37° for twenty-four hours. Body is much swollen and eyeballs project out of their sockets; crepitation and emphysema of the subcutaneous tissues. Liver is transformed into a granular, reddish mass. Gas is present in all the organs and vessels. Cover-slips reveal large capsulated bacilli, and by anaërobic culture of the heart's blood an abundant growth is obtained.

A fourth rabbit was injected intravenously with 3 c.c. of the same bouillon culture. No reaction observed, and remains alive. Animal is killed five days after inoculation, and body kept at 37° C. for seventeen hours; body was then found markedly swollen; gas is present in subcutaneous tissues, but not to so marked an extent as in former rabbit. Scrotum much swollen and emphysematous. Gas is present in all the larger vessels. Liver much softened. An anaërobic culture from heart's blood remains sterile.

The portal of entry in this case was undoubtedly the uterus. There was a rupture of the uterus through which the bacilli could readily obtain an entrance into the tissues during life. The bacilli need not have been introduced during the act of childbirth or version, but may have found the bleeding uterine cavity a suitable soil for growth, or at least existence, before labor occurred. Dead tissue, represented by the blood-clots in the uterine cavity, forms a favorable medium for the growth of the bacillus.

The presence of gas was especially marked around the uterus, the mesentery, and inferior vena cava, less so in the liver. This fact, and the long time after death at which the autopsy was performed, point to a post-mortem invasion of the bacillus and not to a terminal infection or even to an entrance into the general circulation during the death agony. Considering the late autopsy, one would otherwise expect subcutaneous emphysema to have developed. The microscopic sections of the liver show no evidences of a vital reaction around the bacterial emboli. The cells present no signs of degeneration, and their nuclei stain well. Around the gas holes there are no changes, except those due to pressure.

CASES PREVIOUSLY DESCRIBED. In the last few years quite a number of interesting cases have been reported of infection through the genital tract, following upon abortion or during or after childbirth. The most important is that of Graham, Stewart, and Baldwin.[6] The patient was a laboring woman, married, aged thirty-five years. About fourteen hours before death the woman, who had been previously well, was seized with what she described as a severe chill, which lasted more than four hours. This was followed by pain in the region of the ovaries and uterus and by vomiting and purging. She was seen by Dr. Stewart at 1 P.M., five hours after onset of the first symptoms. There was extreme restlessness, distress, and pain in the lower abdominal region, and a slight flow of bright-red blood from the uterus. Abortion was suspected. Her pulse was 120. Morphine was administered hypodermically. At 3.30 P.M. she appeared much relieved and dozed off to sleep. At 9.30 P.M. Dr. Stewart found her "emphysematous from the top of her head to the soles of her feet." Emphysematous crackling could be felt over entire surface of body. There was a diffuse, blood-red color of the whole surface of the body.

A case described by Dalton,[7] although the exact identification of the bacillus is not positive, is considered by Welch as belonging to a class of cases due to the gas bacillus, resembling Graham's case in that in both a criminal abortion had probably occurred. Present illness began a month ago with general malaise and muscular lassitude, menstruation came on and lasted one day, followed by intense headache and costive bowels. About one week ago vomited greenish matter several times. No appetite, tongue coated, liver enlarged and tender. Patient is jaundiced. Whole right pectoral region and arm are swollen and crepitate on palpation. Considerable pain in right breast and arm; respiration hurried and deep. Passages loose. Menstruation present. Many small punctures were made in right breast to allow escape of accumulated gas, having an odor of hydrogen sulphide. Respiration became rapid and difficult, lips and fingers cyanosed, extremities cold; emphysema extended up to neck and almost over entire chest. Died on third day after admission. Post-mortem twelve hours after death by Dr. Bremer. Crepitation of subcutaneous tissues obtainable in throat, thorax, abdomen, and upper extremities. Chest, right shoulder, and neck were puffy and discolored. All the organs were emphysematous. Uterus, 10 cm. in length, contained dark-colored material of the consistency of jelly; fetid odor; tissue firm, but crepitateed and floated in water. Reddish-brown clots in heart, which crepitated. The body was swarming with what he calls organisms. Dalton concludes that the bacillus of malignant œdema was responsible for the condition. The patient had produced an abortion on herself once three months ago and again recently, and Dr. Bremer considers the uterus to have been the point of entrance for the organisms.

P. Ernst[8] describes the case of a woman who developed putrid endometritis and septic peritonitis after removal of a macerated four-months' fœtus, the uterus, through doubt as to diagnosis, having been previously curetted, sounded, and tamponed. No development of gas *intra vitam* observed. At autopsy, made three hours after death, the entire uterine wall crepitated. Coagula in the right iliac vein and conus pulmonalis contained gas. Gas found in the myocardium, and especially in the liver, from the cut surface of which gas oozed up, and in a few hours formed a layer of foam several centimetres thick. Disappearance of the nuclei and other degenerative changes in the liver cells around the masses of bacilli led Ernst to believe that the lodgement of the bacilli in the liver took place during life. The development of gas holes in the liver, however, he regards as a post-mortem phenomenon.

Dobbin[9] describes a case in which a patient had been in labor for two days before admission to hospital. The diagnosis was made of a generally contracted pelvis, conjugata vera 8 cm., large child. Position, left occipito-iliac anterior, impacted head, arrest of labor. A frothy, reddish-brown fluid, having a sweetish smell, escaped from the vagina and contained the gas bacilli in great numbers, as well as streptococci. During life no emphysema was detected. The body soon after death began to swell, and bloody, frothy serum exuded from the nostrils with escaping gas-bubbles. The gas bacilli were found in the vaginal discharge, placenta, and fœtus. Examination of the chorion showed that the large vessels were plugged with the bacilli. The villi are described as necrotic, but no sign of reaction on the part of the tissues was noticeable. Seven hours after death body was enormously swollen. No post-mortem.

Dobbin quotes a case of Schnell's—"Ueber einen Fall von Gasblasen im Blut einer nach Tympania Uteri gastorbenem Puerpera." After a prolonged and difficult version, eighteen hours after death the autopsy revealed gas in the heart, lungs, aorta, liver, and spleen. The case is rendered valueless because of Schnell's preconceived ideas concerning air-embolism and his apparent ignorance of the value of a bacteriological examination.

Menge and Kronig,[10] in their elaborate work on the *Bacteriology of the Female Genital Organs*, draw attention to the rôle which anaërobic bacteria play in diseases of the uterus, especially to those puerperal in their origin. Attention need be drawn to only two of their cases, puerperal patients with demonstration of the presence of the gas bacilli in the amniotic waters.

The first case was a primipara, aged twenty-six years, normal pelvis. Pains began February 15, 1894. In evening bag of waters still intact, rupturing next morning. In evening, attempts to deliver with forceps, without avail. After attempts again to deliver with forceps, cephalotripsy was performed. Bad smelling discharge from the vagina. Course of puerperium ran without fever. On the third day secretion of uterus was examined. Aërobic plates remain sterile. Anaërobic culture reveals the gas bacillus. On the ninth day the discharge was no longer badly-smelling, and cultures remain sterile. Although the woman had no temperature or other signs of infection, the perineal wound was not fresh, edges were covered with a grayish-white layer. The tissues in the neighborhood of the tear were necrotic, the resulting tear became three times its original size, and only slowly healed by granulation. Autopsy of child six hours after delivery, the weather being cold. The bacilli were demonstrated on smears and by cultures in the secretion of nose, throat, and armpits. Stomach distended with gas, which burned with a bluish flame and contained a brownish, greasy fluid, evidently the swallowed waters. In the pleura and peritoneal cavities there is a little blood-stained serum. Beneath the pleura pulmonalis, especially over the lower lobes, numerous bean-sized bubbles. Smears from heart's blood reveal thick bacilli positive to Gram's stain. Blood of the cord is sterile. From the lung and stomach the anaërobic bacilli were recovered by culture.

The second case was a primipara. Hard labor, turning unsuccessful, prolapse of cord. Pains began again after the narcosis. In evening of the same day, temperature 39.6° C., pains have ceased. Abdomen is distended over the uterus; no tympanic note. Fever indicated necessity for extraction of the child. After birth, bad-smelling fluid, with little blood but much meconium escapes. After delivery of placenta uterus was washed with permanganate. Fever disappeared after delivery of placenta. Patient left hospital on ninth day. Lochia examined on sixth day. Numerous cocci and thick rods were found. Aërobic plates remain sterile. Section of child immediately performed. Over lower lobes a few gas bubbles are present beneath the pulmonary pleura. Slight amount of bloody fluid in pleural and peritoneal cavities. Numerous rods present in the liver, lung, less abundant in the kidney and spleen, placental end of cord being sterile. Aërobic cultures from blood and organs, sterile. Anaërobic positive. Sections of the organs by Gram-Weigert method revealed the rods. Kronig describes what he calls a most characteristic rancid-butter smell to the cultures in grape-sugar gelatin, and this odor is noticeably present in the amniotic waters when infected by this bacillus. Dr. Dittel, of the same clinic, by this odor has been able in two other cases to make a preliminary diagnosis of their presence.

Kronig has obtained by sterile catheters the amniotic waters from feverish puerperal patients; in twelve out of fifteen cases anaërobic bacteria were alone present, a strictly anaërobic streptococcus being not infrequently found; twenty-one cases were examined in all, three being thus sterile.

In a case of labor which became septic after delivery the writer isolated in pure culture a strictly anaërobic streptococcus from the very bad-smelling lochial discharge a week after delivery. No other species present, either aërobically or anaërobically. It resembled the ordinary streptococcus pyogenes longus in its morphology and bouillon growth. It apparently possessed little or no pathogenic powers upon rabbits intravenously injected, and was identical with the streptococcus isolated by Kronig. Three generations were grown on glycerin and grape-sugar agar. The aërobic streak and pour-plates always remained sterile. Death four weeks after delivery with an empyema. From the exudate and lungs the ordinary streptococcus pyogenes was alone obtained in cultures made after the autopsy. One side of the cervix and uterus was converted into a suppurative phlegmon. Bacteriological examination of the pus revealed the streptococcus and a large facultative anaërobic bacillus, with colonies resembling most strikingly those of the bacillus aërogenes capsulatus.

Menge and Kronig identified the bacillus they isolated from their cases completely, and it is refreshing to observe that they were completely familiar with the original article of Welch and Nuttall as well as Fraenkel's monograph, *Ueber gas Phlegmonen.*

Lindenthal[11] (*Zur Aetiologie der sogenannter, Kolpohyperplasia cystica*) isolated an anaërobic bacillus from a case coming to autopsy, resembling that of Welch. He believes it to be the cause of the gas cysts in the vagina, which occur especially after labor. Injection of pure cultures into the cellular tissues of the vagina reproduced the lesion in guinea-pigs. The gas production was most marked in a guinea-pig whose body had been allowed to stand a few hours before the section was made.

The bacillus, which he unnecessarily names the bacillus emphysemæ vaginæ, he believes belongs to the group or is a variety of the bacillus of malignant œdema. It, however, possesses no spores or motility, takes Gram's stain, and produces a fatal gaseous emphysema with sero-hemorrhagic exudate after subcutaneous injections in guinea-pigs and in mice. In rabbits a hard induration or an abscess forms after subcutaneous inoculation. Intravenous injections in only one out of a series of six rabbits were followed by death. Intra-abdominal inoculation in rabbits was negative; in guinea-pigs, two out of four succumbed from a slightly seropurulent peritonitis. Lindenthal is disinclined to consider his bacillus as identical with Welch's or Fraenkel's bacillus. The absence of capsules is not important evidence against its identity, for, although apparently familiar with Welch's work, he ignores or probably never employed his staining method. Although the writer has been able at times to stain the capsule of the bacillus aërogenes by the two methods Lindenthal employed, as a rule with these methods capsules were not demonstrable. No mention is made of his having employed the body of the dead rabbit as a culture medium or for diagnostic purposes. From the marked points of identity as described in his article, I am led to believe them to be identical.

Lindenthal[12] has reported the bacteriological examination of four cases of tympania uteri. The same bacillus was isolated. Cultures injected into the uterus after opening of the peritoneum gave rise to a condition similar to tympania uteri in guinea-pigs. He is disinclined to believe that the bacillus coli communis, in the absence of a sufficient amount of sugar, can induce the same amount of gas production in tissues. His attempt at experimental reproduction of the lesion with the colon bacillus was unsuccessful.

Welch believes that the colon bacillus is not capable of inducing the amount of gas production in the tissues which is such a marked characteristic of the bacillus aërogenes capsulatus.

In two cases in which gas was present in the tissues at autopsy, where the gas production was not due to the bacillus aërogenes capsulatus, this opinion of Welch's is borne out. In a case of traumatic seropurulent peritonitis, following a rupture of a duodenal ulcer, running a latent course, post-mortem, eighteen hours after death, the bacteriological examination of the exudate revealed the colon bacillus and the streptococcus pyogenes. Between the muscular layers of the abdominal parietes there was a moderate amount of emphysema and crackling on pressure which extended into the cellular post-peritoneal tissues. The gas bacillus was not recovered on smears from the exudate or emphysematous tissues, and anaërobic culture, as well as inoculations into rabbits killed shortly afterward, failed to reveal it. From the emphysematous abdominal walls the colon bacillus was isolated. In a second case, a late autopsy on a case of arteriosclerosis, there was a slight emphysema of the cellular tissues over the lumbar muscles. A bacillus resembling the colon bacillus was isolated in pure culture. In both cases evidence of gas in the circulation and organs, although most carefully looked for, was missing.

To summarize briefly the cases here cited of Graham and Dalton, the local infection was followed by a systemic or ante-mortem infection. In Dobbin's case, although definite proof is lacking, little doubt can be held that such a terminal invasion of the bacilli took place. P. Ernst's case must also be held as analogous in this respect to Dobbin's. In the remaining cases cited the bacilli do not give evidence of having gained an entrance into the general circulation, or were rapidly destroyed by the bactericidal or phagocytic powers of the blood and tissues. The variety of the lesions produced by the gas bacillus after infection through the female genital tract is interesting and suggestive of the constant warfare taking place between the animal cells and fluids against micro-organisms. The pathogenic qualities of the bacillus are thus seen to be most varied.

CASE II.—*Acute Leucœmia, Terminal Infection with Bacillus Aërogenes Capsulatus.* Colored man, aged fifty years, admitted to the service of Dr. Delafield at the Roosevelt Hospital, December 17, 1896.

Personal history previous to present illness, negative. For past three months has had pains in joints of upper and lower extremities; last few weeks pain was worse. Complained also of fever, slight nausea, and vomiting. Appetite fair; constipation; insomnia.

On admission, patient is fairly well nourished; pulse fast, but of good force. The right knee is a little swollen and tender. Temperature 100°; pulse 100; respiration 26. Urine acid, 1020; trace of albumin, no sugar; microscopical examination negative. Physical examination on admission reveals subcrepitant râles over the lower part of both lungs. Apical impulse in fifth space inside nipple line. In third left space near edge of sternum there is a harsh systolic murmur and a roughening of first sound. Liver and spleen are negative.

On January 4th patient had a chill. January 5th, temperature in the morning 105°; during the next week temperature ranged between 101° and 103°. After rise of temperature on January 6th there were present signs of fluid or of consolidations over the left lung. During the whole of illness abdomen was tympanitic. Spleen is now felt four inches below costal border. Right leg also reported as swollen.

On January 8th a blood examination was made by Dr. Ewing, who reports the case to be one of spleno-myelogenous leucæmia, the leucocytes outnumbering the red blood-cells. Temperature on 9th rises to 105°. Death on January 10th. Post-mortem, 8 P. M., January 11th, twenty-four hours after death, body having been kept in a cold room.

Post-mortem notes: Subcutaneous tissues over trunk, abdomen, and extremities crepitate. Abdominal cavity is filled with gas which ignites and burns with a blue flame. The mesenteric veins and vena cava are distended by gas; *no signs of peritonitis;* a little bloody serum in peritoneal cavity. Along the mesenteric attachment of stomach and intestines are small split-pea to almond-sized pigmented areas extending to rectum.

Heart in advanced stage of decomposition; no pericarditis or endocarditis.

Lungs slightly congested and œdematous. Bronchial lymph nodes not enlarged. Areas of broncho-pneumonia are present in both lungs.

Spleen: Weighs 26 ounces, is rather firm; follicles are much enlarged. A perisplenitis of a recent date is present. Organ is emphysematous.

Liver: Weighs 4½ pounds; surface and section smooth; color of cut section is dark and slaty; tissues riddled with gas bubbles; markings are obliterated.

Pancreas: Appears much decomposed.

Kidneys: Enlarged and emphysematous. Capsule not adherent, surface smooth and mottled, with petechiæ markings obliterated. Pelvic mucosa is infiltrated with blood.

Stomach: Petechial spots in mucosa. Inguinal and cervical and axillary glands are enlarged and deeply pigmented. Marrow of shaft of femur partly fatty and reddish in color.

Brain: Very anæmic; a few small hemorrhages in the pia mater.

Ribs are very fragile, and their marrow consists of a waxy and homogeneous substance, no red matter being present. Lingual tonsils are a little enlarged and deeply pigmented. Heart's blood watery. A few light-colored clots in right ventricle.

Anatomical Diagnosis: Acute leucœmia, hyperplastic splenitis, chronic lymphadenoma. Cultivations were made from the liver and from the contents of a loop of the small intestines, tied off at both ends at the autopsy. Smears from the liver reveal large bacilli with square ends, with capsule staining by Welch's method. A few cocci and short rods resembling the colon bacillus are also present in small numbers.

In aërobic cultures from the liver numerous colonies of the staphylococcus pyogenes aureus developed. An oval rod was also isolated, giving a whitish stab-growth, with a tendency to spread on the surface.

The anaërobic plates from the liver and intestines developed numerous typical colonies of bacillus aërogenes capsulatus.

By aërobic culture the staphylococcus pyogenes aureus and the colon bacillus were isolated from the contents of the intestine.

Animal Experimentation. A piece of the liver dropped in bouillon and left in thermostat overnight; next morning bouillon is black, and much gas is present around the piece of liver. Cover-glass preparation shows numerous capsulated large bacilli and cocci.

A large, healthy pig was injected subcutaneously in abdomen with 2 c.c. of this bouillon; next morning a large, fluctuating swelling, which, on tapping, emits a splashing sound, is present over abdomen. Crepitation is marked. Death twenty-four hours after injection. Autopsy performed just after death; hair over abdomen epilates easily. Subcutaneous tissues are necrotic and are lifted up from the muscles, necrotic strands of tissue still connecting the layers. These spaces are filled with a slightly hemorrhagic fluid and with gas which escapes. The necrosis extends over whole of front of abdomen and thorax. The odor of the fluid is sweet, but not disagreeable. Abdominal and thoracic muscles are covered with a white pasty necrotic mass. A few ecchymotic spots under the peritoneum. Intestinal vessels are injected and distended. Suprarenals slightly enlarged. In the lungs a few hemorrhagic areas. Kidneys, liver, and spleen appear normal. Heart cavities are filled with dark, fluid blood. Cultures, anaërobic and aërobic, from heart's blood remain sterile; cover-slips reveal no bacteria. The subcutaneous tissue cover-slips show numerous large capsulated rods. Cocci and also oval rods or cocci in chains, which were seen previously in the liver-smears, are present. The anaërobic plates from the subcutaneous tissues show typical colonies and gas-bubbles.

Injections of the Bloody Exudate. 2 c.c. of the hemorrhagic fluid of the gaseous phlegmon, injected subcutaneously in a guinea-pig (No. 2), caused death in eighteen hours; a fluctuating swelling formed over whole of abdomen and thorax. Section four hours after death reveals extensive necrosis of the muscles of abdomen and thorax, with a hemorrhagic œdema in the dependent portions. A clear and slightly hemorrhagic fluid is present in the peritoneal cavity. Cover-slips of this fluid and from the fluid of the phlegmon, several numerous capsulated bacilli, a few smaller rods and cocci. Intestinal vessels are deeply injected. Spleen not enlarged, and shows small, whitish spots. Smears from the liver reveal numerous capsulated rods. By anaërobic culture the bacilli are recovered from the heart's blood, liver, and phlegmon; by aërobic culture, the staphylococcus pyogenes albus.

2 c.c. of the hemorrhagic fluid of pig 2 inoculated in pig 3 caused a gaseous phlegmon, with death in forty-eight hours. Similar postmortem appearances. Smears from the phlegmon reveal several large capsulated bacilli and numerous cocci.

2 c.c. of the hemorrhagic fluid of pig 3 injected subcutaneously in pig 4. Next morning a hard swelling, size of a large walnut, has formed at site of the inoculation. Death in thirty-six to forty hours.

Pig 6 receives 1.5 c.c. of the hemorrhagic fluid of pig 4. A hard swelling forms at site of inoculation, death occurring in four days. Little hemorrhagic fluid is present.

These successive inoculations from pig to pig were employed with the view of increasing the virulence of the bacillus and to obtain the toxins either by filtration of the hemorrhagic fluid contained in the phlegmon or in artificial cultures after inoculation by bacilli of a higher degree of virulence. We were not successful, because the quantity of hemorrhagic fluid decreased from animal to animal. We were also never dealing with pure cultures, but the series was continued, as it seemed the easiest way to keep the bacilli virulent and alive.

Inoculation of Pure Cultures. Pig 5 received the whole of a forty-eight-hours' growth in a stab-agar tube, showing marked development of gas. Animal develops a gaseous phlegmon, which, later, becomes hard and breaks externally. An extensive area of suppuration is formed, extending over the dependent portion of abdomen and thorax. Cicatrization completed two weeks later. Animal dies later from marasmus.

Second Series of Inoculations from Animal to Animal. Pig 7 received 2 c.c. of an emulsion in sterilized salt solution of an actively-growing forty-eight hours' old culture, representing a third generation from the liver, in a sugar-agar stab. Gaseous phlegmon develops promptly; lives nineteen and one-half hours. Autopsy held at once after death. Much hemorrhagic fluid has collected between the skin and muscular layers in a sac occupying the whole of the thorax and abdomen. Axillary and inguinal lymph-nodes are reddened and hemorrhagic. The muscles of abdomen and thorax are intensely congested, the whitish necrosis here being confined to site of inoculation and of limited extent. Some clear fluid in peritoneum; spleen not enlarged; kidneys appear swollen; urinary and gall-bladders are distended. Liver somewhat enlarged; lungs normal; both chambers of heart in diastole and filled with dark, fluid blood. Pericardium contains clear fluid. Hair of abdomen epilates easily. Both horns of uterus contain two fœtuses. Hanging-drop from subcutaneous fluid shows enormous numbers of large rods which are *non-motile.* These rods show very slight Brownian movement.

Cultures. All anaërobic plates on sugar-agar allowed to grow three days before being examined. The subcutaneous plates reveal typical growth in original and in both dilutions.

Urine. Original shows typical superficial and deep colonies controlled by smears. *Bile* and blood of heart, sterile. *Spleen* plate sterile, but a melted sugar tube at 40° shows a few large colonies at bottom of tube. *Kidney* plate sterile; a stab-tube reveals a growth, however. *Liver* plate, numerous colonies and large gas bubbles. Presents a pure culture. A smear from the subcutaneous fluid reveals capsulated rods, and chains of short but thick rods are numerous. Smears from pericardial fluid and from heart's blood, spleen, and liver negative. In peritoneal fluid a few capsulated rods. Plates on plain agar from the heart's blood, after three days at 37° C., remain sterile.

Pig 8 inoculated with 0.5 c.c. of same emulsion that pig 7 received on 23d at 4 P.M. Died during morning of 25th. Autopsy about eight hours after death. The skin of abdomen is raised by a soft fluctuating swelling, which is readily movable; in places crepitation is made out. Gas in swelling ignites with a bluish flame and detonates slightly. Epilation of hair does not readily take place as in pig 7. Rosy-colored fluid and necrosis are present. Pericardium and peritoneum contain a little clear fluid. Adrenals are not hemorrhagic. Spleen slightly enlarged; Malpighian bodies are more prominent than usual. Heart dilated, dark, fluid blood in both chambers.

Cultures. Plain agar plates grown aërobically, after five days at 37° C., from the subcutaneous tissue, the blood of the right heart, the liver, kidney, urine, and spleen, remain sterile.

Anaërobic cultures on sugar-agar; all plates allowed three days of growth at 37° C. Bile and urine sterile. Liver plate sterile; a stab, however, shows growth. Kidney and spleen plates develop typical colonies with gas bubbles. Right heart plate sterile; stab from both auricles shows growth, smears revealing typical rods. Subcutaneous tissue overcrowded; original growth in both dilution plates. Peritoneum, a characteristic stab growth in sugar-agar in pure culture.

Pig 9. 25th, 2 P.M., received 1.5 c.c. of subcutaneous hemorrhagic fluid of pig 8. Next morning animal appears well, but has quite an extensive collection of fluid on one side, near site of inoculation, which moves on pressure, and on tilting abdomen a gas bubble is seen to move upward and downward; over site of bag of fluid superficial layers of epidermis and hair have peeled off. Died morning of 27th. Section 12 M., 27th, body during morning being kept in cold storage. Postmortem appearances similar to those above described. Aërobic cultures of kidney, liver, and right heart's blood are sterile. Spleen plate is badly contaminated, also the plates from the subcutaneous fluid. Anaërobic culture; blood from right heart sterile. Spleen plate, numerous colonies of bacteria. The hemorrhagic fluid, original, and first dilution plate show a pure culture of the bacillus aërogenes capsulatus. Smears from peritoneum reveal a few capsulated rods; from the hemorrhagic fluid, large rods alone. The bile, liver, kidney, and amniotic fluid are sterile. A stab in sugar-agar from left heart shows in a pure culture. Urine plate contains twenty-five colonies in pure culture.

Pig 10. Injected subcutaneously, at 3 P.M., 27th, with 1 c.c. of the slightly-turbid hemorrhagic fluid of pig 9. Weight, 402 grs. Soft, movable swelling, with gas and crepitation, is soon felt. Found dead at 8 A.M., 28th. Weight, 413 grs. Section three hours later; some extensive undermining of the tissues. Slight amount of fluid in pericardial and peritoneal cavities. Heart filled with dark, clotted blood. Lung shows a few hemorrhagic areas. Liver and kidney normal. Left adrenal blackish, almost no cortex being visible. Spleen normal. Uterus contains four small fœtuses.

The aërobic cultures were contaminated from unsterilized plates.

Anaërobic culture: Kidney, spleen, and liver plates were sterile.

Bile, urine, and blood of right heart reveal a growth. Subcutaneous tissue, typical rods, but also other smaller rods have grown.

Rabbit 1. 1.5 c.c. of the hemorrhagic fluid of pig 10 injected intravenously at 11 A.M., 28th. At 1 P.M. rabbit was lying on its belly; does not rise on poking it. 3.15 P.M., found dead; abdomen then hard and swollen. Two and a half hours later crepitation is felt over whole surface of body. The frothy, blood-tinged fluid oozing from nostrils contains, at this time, large capsulated bacilli. Body, kept at room temperature overnight, is found tremendously swollen. All the organs markedly emphysematous. Blood and tissue fluids contain enormous numbers of rods.

1.5 c.c. of the hemorrhagic fluid of pig 10 injected subcutaneously in abdomen at 11.30 A.M., 28th, into pig 11; found dead at 8 A.M., 29th. Crepitation over swelling is present. At one place the muscular layer has been thinned, so that an opening between the peritoneum and the phlegmon may exist. Intestines and stomach show intense injection of their vessels; reddish fluid is present in the peritoneum, but no whitish exudate. Organs normal in appearance.

Anaërobic culture: Three days' growth at 37° C. Right heart and kidney are sterile. Liver shows overcrowded colonies, a pure culture apparently. Urine, numerous typical colonies develop. Aërobic plates from the liver are overgrown with a bacillus resembling the colon bacillus.

The subcutaneous plates, aërobic and anaërobic, are overgrown by a greenish growth. A smear of peritoneal fluid reveals numerous typical rods recovered by culture, also oval cocci and a few thinner rods.

Rabbit 2. Injected intravenously with 0.2 c.c. of the peritoneal fluid of pig 11, at 1.15 P.M., 29th. Several hours later animal is quiet. Found dead next morning. The body is much swollen, and crepitation is everywhere present. Emphysema of all organs and vessels. Peritoneum distended with gas, burning with a bluish flame.

A Third Generation in Sugar-agar Thirteen Days Old. 1.5 c.c. of an emulsion in sterilized salt solution of a culture containing the bacilli in enormous numbers was injected subcutaneously in each of two pigs. Pigs reactionless. Bacilli stained well and gave a growth on transplanting.

Other attempts to produce, with pure cultures, an emphysema in guinea-pigs were made, with negative results.

In this case terminal infection with the bacillus aërogenes capsulatus seems probable. The abdominal symptoms, pain, tenderness, and tympanites, which became very marked several days before death of the patient, made the diagnosis of peritonitis a probable one, and this diagnosis was entertained, although no cause could be assigned for it; but no peritonitis existed. Emphysema of the subcutaneous tissues, *intra vitam,* was not observed, but no especial attention was paid to this point.

Sections of the liver show larger and smaller gas-holes which are empty. The bacilli are collected around the periphery of these cavities. Evidences of compression of the liver cells surrounding the gas-holes are present. These cells are converted into a mass of badly-staining protoplasm, the outlines of the individual cells being only occasionally made out. Nuclear staining is absent. Where the cells are not so badly disturbed there is vacuolation.

The masses of bacilli are situated mostly in the central veins, and evidence of gas is not always seen. The cells surrounding these bacterial masses show the same loss of nuclear staining and vacuolation. In places the portal vessels contain bacilli. The characteristic large bacilli, staining beautifully by Weigert's method and also by hæmatoxylin, were alone noticed. In the capillaries between the liver cells are seen a few isolated bacilli; toward the periphery of the bacterial emboli they are more numerous. Some of the large hepatic veins contain fibrinous clots or thrombi, with but few bacilli.

The whitish areas of necrosis, with small central gas-holes observed and described by Ernst in one of his cases, were carefully looked for in the liver, macroscopically, but were not present. In the first case of Ernst the autopsy was made three hours after death, and it seems not unlikely that had our case come to autopsy at so early a time similar appearances might have been noted. The change described above in the liver cells, the areas of necrosis surrounding the bacterial growths, in our case never extending quite the whole breadth of an acinus, have been considered by Ernst and by Welch and Nuttall as indicative of a vital process produced by the toxic products of the growth of the bacilli. The liver was also the seat of a marked congestion of the capillaries. It seems most probable that the bacilli gained entrance into the portal circulation through the intestinal coats, which, perhaps, were impaired by a venous congestion, and found in the slow circulation of the mesenteric and hepatic veins a suitable soil for development, giving rise to the abdominal symptoms. The presence of thrombi in the hepatic veins would have favored their growth, the blood in the portal circulation being thus more than ever poorly oxygenized.

The tissues of the small intestines are necrotic, everywhere invaded by myriads of bacilli, and have undergone so much post-mortem change that a further examination was valueless. The kidneys in places are the seat of a marked leucæmic infiltration. The bacilli are in masses inside the bloodvessels and in the tufts. A few casts and bacterial masses are present in the collecting tubules. The parenchyma around most of these bacterial plugs appears unaffected, but in places there is for a considerable distance a loss of nuclear staining. No vacuolation is present. Otherwise the kidney presents the appearance of a parenchymatous degeneration. The spleen shows evidences of compression and necrosis in the cells around the gas-holes. Similar areas are present in the vicinity of the bacterial plugs.

The absence of cocci in the sections of the liver, and their presence by culture in the contents of the small intestines, lead to the opinion that the cocci gained entrance to the liver after death.

Without wishing to lay special stress on the point, it is interesting to note that Dr. Ewing, in examining the blood smears stained by eosin and methylene-blue, prepared three days before death, found a few large bacilli. It is to be regretted that no cultures were made of the blood during life.

Similar Cases of Suspected Terminal Infection. In July, 1895, Goebel,[13] in an article "Ueber den Bacillus der Schaumorgane," confirmed the work of Welch and Nuttall, and identified his bacillus with the bacillus phlegmones emphysematosæ of Fraenkel. He also comes to the conclusion that in two of his cases there was a terminal infection.

The first case was one of pyelonephritis consecutive to papilloma of the bladder and abscesses of the prostate and seminal vessels. Gas-blebs were found in the heart muscles, liver, spleen, adrenals, and stomach.

Around many of the blebs in the heart and liver the cells were necrotic. In the spleen necroses were not present around the gas-blebs. The lesions in the liver were nearly similar to those described by Ernst in the livers of one of his cases. He concludes that the disappearance of the nuclei and degenerative changes around the masses of bacilli point to a vital process and not merely to a post-mortem change. The portal of entry, he concludes, on account of the frequent catheterization before death, to be the genito-urinary tract.

The second case was one of enlarged prostate in a man, aged sixty-six years. Frequent catheterization was necessary. The post-mortem diagnosis was emphysema pulmonum, pneumonia lobularis, embolia art. pulm. lob. inf. sin., and arteriosclerosis universalis. Numerous gas-blebs were found beneath the mucous membrane of the urinary bladder. Necroses were absent from the walls of these blebs. Capsules were demonstrated in smears from the gas-blebs of the bladder. In cultures these capsules were absent, except in one instance. He holds that the invasion in the bladder-walls was a post-mortem phenomenon, on account of the absence of the vital changes in the bladder above described.

The third case was one of pyæmia following endophlebitis of the cutaneous veins of the left foot. Beneath the gastric and intestinal mucosa were gas-blebs resembling those in the preceding case, except that necroses were present around the blebs. The intestine he considers to be the portal of entry for the bacilli. Evidences of gas were absent, except in one of the femoral arteries. The experiments of Welch and Nuttall were repeated with identical results both with the bacillus isolated from foaming organs and with that from gaseous phlegmons. Necroses were absent from the walls of gas-holes developing in the organs of dead rabbits. Spores were present in one culture, a stab forty-eight hours old, in a sodium formate agar-tube. Liquefaction of gelatin with cultures from Case I. was slow and limited; with those from the second it was rapid and marked. Subcutaneous inoculation of guinea-pigs was followed by fatal gaseous phlegmons.

CASE III.—*Hypertrophic Cirrhosis.* Dr. Norrie, assistant physician; Dr. McClellan, house physician. Patient, aged fifty years; admitted February 6, 1897; died February 7, 1897.

Personal History. Markedly alcoholic. Patient was well up to two months ago, when he began to complain of pain in right side. For past three weeks has had dyspnœa and insomnia. Three days ago suddenly began to vomit large amounts of clotted blood. Blood in stools. Œdema of feet the last four days. Apex in fifth space inside of nipple line; action rapid and regular. Systolic murmur in third and fourth space close to border of sternum. Lungs negative. Liver, from fifth rib to free border, edge not felt. Abdomen large; superficial veins are prominent; abdomen tympanitic. Pulse rapid, regular, and of good force. No tension. On day of admission said to have had bloody expectoration; vomited a few ounces of blood. Patient became weaker, delirious, and died with signs of œdema of lungs. Urine was bile tinged, otherwise negative.

Post-mortem by Dr. Norrie, twenty-seven hours after death. Large frame, adipose abundant. Rigor mortis is present. All the subcutaneous tissues are tremendously inflated with gas, which escapes and burns with a bluish flame. Foul odor. A number of discolored blebs filled with serum are situated on the thighs and trunk. Face is much swollen and discolored. Gas and blood bubble out of mouth. Scrotum much swollen with gas. Heart weighs sixteen and one-half ounces and is dilated; valves normal. Post-mortem change very marked. Both lungs are congested.

Liver weighs six and one-quarter pounds; its surface is rough, and consistency very firm. On section, lobules stand out prominently. The liver is fatty and cirrhotic. Bubbles of gas escape on section. Spleen about eight inches in length, very soft. Kidneys show marked post-mortem change. Stomach filled with clotted blood. Mucous membrane is much congested.

Anatomical diagnosis: hypertrophic cirrhosis of liver; dilatation of heart. At the laboratory liver was found to be large and firm, and of a blackish-green color; crepitation on pressure, and on standing at room temperature crackling is heard.

Cultures were made from the liver and from a loop of small intestine tied off at the ends during the autopsy. Cover-slips from liver show the characteristic large rods, with well marked capsules, staining by Welch's method and by nearly all, except Gram's, stains. Diplococci more or less lancet-shaped and staining by Gram's stain, also thinner rods negative to Gram are seen, and large coccus or oval forms in chains positive to Gram. Smears from the intestinal contents show large capsulated rods in great abundance. Shadows are also seen which do not stain, except along a narrow edge. The vast majority of the bacilli present can be identified as the bacillus aërogenes capsulatus.

A piece of liver was crushed up in salt solution in a test-tube; 1.5 c.c. of this solution was inoculated intravenously in a rabbit, and the same amount subcutaneously in a pig; next day the pig had developed a hard, elongated swelling over front of abdomen, extending well up over chest. Three days after inoculation the skin over the swelling had ruptured. Animal does not appear sick, and eats well. After eight days cicatrization is present, but the wound exudes still a little bloody fluid. Animal recovers.

The rabbit, a few hours after injection, appears quiet. Twenty-four hours later the animal is killed, and the body is left overnight at room temperature. Crepitation next day is apparently felt. The body is then placed three hours at 37° C. On section no gas was present. Cover-slip from peritoneum and blood reveals rods resembling the colon bacillus. No cultures made. Post-mortem softening is marked. In this case twenty-four hours' sojourn in the circulation of the rabbit was sufficiently long to kill the bacilli.

Aërobic plates on plain agar from the liver. Original is overcrowded with colonies, apparently of one kind. First dilution plate shows colonies of one kind, resembling the pneumococcus. Deep colonies are grayish-white; under lower power are nearly black. Surface colonies have a light-bluish color and are nearly transparent. Under lower power are granular, the centres being dark and edge beaded. Smears from numerous colonies reveal a coccus positive to Gram, mostly in chains, many distinctly lancet-shaped. Size of cocci varies slightly. Bouillon inoculated from these colonies gives a whitish sediment and a slight diffuse cloudiness. Milk coagulates between forty-eight and seventy-two hours. Stab-gelatin tube shows a growth after three days, consisting of small, isolated, and whitish colonies. No surface growth and no liquefaction after fifteen days. Smears reveal streptococci and diplococci. A mouse inoculated intraperitoneally with an emulsion of salt solution from numerous colonies on original plate shows no reaction, and lives.

The streptococcus was identified as one of those forms which cloud bouillon.

The anaërobic plates on sugar-agar from the liver; original is overcrowded with small colonies, dark in color, with characteristic branching projections, and gas develops on second day. Smears reveal threads and long rods, the short, thick rods observed in the liver smears not being present.

By aërobic culture from the contents of the intestines were isolated the colon bacillus and a diplococcus resembling that recovered from the liver.

The anaërobic plates, the original, develop colonies of the bacillus aërogenes capsulatus and the bacillus coli communis. The second dilution plate presents a pure culture of the former.

The portal of entry for the bacilli in this case would seem, although this is not susceptible of definite proof, to have been the intestinal tract, probably a post-mortem invasion through the patulous and ruptured œsophageal veins.

Animal Inoculations. Pig 1 inoculated subcutaneously with 1.5 c.c. of a turbid bouillon culture, grown anaërobically for four days, develops a few hours later a soft, fluctuating swelling, which is tender to the touch and crepitates. Death in thirty-six hours. Typical post-mortem appearances. Cultures were made several hours after death. The aërobic cultures on plain agar from all the organs and from the fluid of the phlegmon are sterile. The gas bacillus was obtained by culture from the blood of the left heart, peritoneum, urine, and the hemorrhagic fluid. Right heart, liver, kidney, and the gall-bladder sterile.

Pig 2. Inoculated with a like amount of same culture, develops a gaseous phlegmon which breaks externally. The swelling is surrounded by a hard induration which extends over part of thorax. Animal slowly recovers.

Pig 3. 1.5 c.c. of the slightly-hemorrhagic fluid from pig 1 was injected subcutaneously in pig 3; several hours later a small swelling, freely crepitating, has formed, which rapidly enlarges and becomes soft and fluctuating. Death in less than forty hours. Same post-mortem appearances. Hemorrhagic fluid does not present a pure culture, cocci being seen on the smears. Autopsy several hours after death. Anaërobic cultures from the urine, hemorrhagic fluid, and peritoneum alone show a growth of the gas bacillus, the organs and heart's blood being sterile.

Aërobic plates from the spleen, liver, kidney, and right heart's blood are sterile.

The aërobic plates of the hemorrhagic fluid contain numerous colonies resembling those of the colon bacillus. In making inoculations to determine the cultural characteristics of this bacillus it was observed that a milk-tube, grown aërobically, presented after forty-eight hours a firm clot floating on the surface of a clear serum, and it emits a strong smell of stale glue. Smears reveal large capsulated rods, also rods resembling those taken from the colony. A second milk-tube inoculated from this milk-tube revealed a similar appearance after forty-eight hours' growth. Typical colonies developed by anaërobic cultivation. Inoculation from these colonies refused to grow aërobically. This occurrence shows the ability of the anaërobic bacillus to grow under aërobic conditions in the presence of anaërobic bacilli belonging to the colon group. In fishing the aërobic colony a few rods, which were present in the media, were carried over into the milk-tube with the aërobic bacilli.

Rabbit 1. 1.5 c.c. of the hemorrhagic fluid from subcutaneous tissue of pig 1 was injected intravenously. Half an hour later rabbit dies suddenly with violent clonic convulsions. Soon after death abdomen becomes hard and tense. Crepitation develops after a few hours in the subcutaneous tissues, and the bloody froth oozing from nostrils contains the bacilli four hours after death. Next morning body is still more swollen. All organs and tissues are riddled with gas bubbles. Smears reveal large rods with capsules staining by Welch's and by Luepke's method. No cultures were made. Body floats lightly on surface of water. Death was probably due to embolism.

Rabbit 2. A large buck-rabbit receives intravenously, at 2.45 P.M., 1.5 c.c. of same bouillon culture which was used to inoculate pigs 1 and 2. Temperature 102.2°. No effect noticed. Animal remains alive.

Rabbit 3. Receives a like amount of the same bouillon culture; killed at once and left at room temperature. Body becomes swollen in a few hours. Next morning body is tympanitic, gas present everywhere. Gas ignites with a slight report and a bluish flame.

50 c.c. of gas contained in the peritoneal cavity collected and, by analysis, is found to consist principally of HCO_2 and small traces of CH_4.

Pig 4. 0.3 c.c. of the hemorrhagic fluid of pig 3 injected in subcutaneous tissue of abdomen of pig 4 causes a swelling which shows fluctuation and crepitation. Death six days later. Skin has nearly broken through centre of the swelling, the edges of which are infiltrated and hard. Section a few hours after death; anaërobic culture of blood, urine, and organs fails to reveal the gas bacilli. The aërobic bacilli present in the hemorrhagic fluid injected are recovered by culture in all the organs, bile, blood, and hemorrhagic fluid.

The Effect of the Toxins developed in Artificial Culture of the Bacillus Aërogenes Capsulatus. To determine the character and amount of toxins produced in artificial culture media, a half-litre of 2 per cent. grape-sugar bouillon was inoculated from one of the colonies on the anaërobic plates from the intestine. The flask placed for two weeks at 37° C. in an anaërobic jar. Cloudiness of bouillon after twenty-four hours, fluid becoming clear after four days, and there is formed a considerable whitish sediment. Supernatant fluid was decanted off and filtered through porcelain filters by Dr. Prudden.

A large hare, weighing 2130 grs., received intravenously 8 c.c. of this fluid, warmed to a temperature of 37° C., 2 c.c. being injected at intervals of five minutes. After injection, respirations are labored and hurried.

Temperature per rectum before inoculation 102.8° F. Temperature per rectum three-quarters of an hour later 103.4° F. Animal quiet. Ears cold. Three hours after injection, temperature 104.6° F. Four and one-twelfth hours after injection, temperature 103.1° F. Twenty-three hours after injection, 102° F. Ears warm. Weight 2080 grs. Little effect was thus noted.

White rabbit; weight, 1848 grs. 13 c.c. at 37° C. were injected intravenously, fluid being at body temperature. Temperature before inoculation, 101.8° F. One hour later, temperature 103.5° F. Ears warm. Animal apparently unaffected. Fifty hours after injection, temperature 100.8° F.; ears and body warm. Rabbit appears sick, but remains alive.

Guinea-pigs. A guinea-pig receives 6 c.c. of the filtered toxin subcutaneously. Temperature before injection 101.2° F.; one hour later, 96.8° F. Hair of shoulders and neck stands erect, abdomen is tender to the touch, and the animal lies on its side, trembles, and strokes mouth with its paws. Temperature three hours after injection 100.7° F., and the pig is still shaking. Twenty hours later, entirely recovered; temperature 101.9° F.

A second pig receives intraperitoneally 12 c.c. Before inoculation, temperature 101.8° F.; one hour later, temperature 95.4° F. Animal is very sick and weak, and lies on its side. Hair of shoulders and neck erect, violent shaking. After three hours, temperature 96.8° F. Animal shaking violently. Twenty hours after injection, temperature 102.8° F. Animal has recovered entirely.

These experiments show that the filtered bouillon has a marked toxic action on guinea-pigs, but that little toxic action is apparent after intravenous inoculations in rabbits.

The Effect Produced by Dead Bacilli. To determine the effect of the dead bacilli, the whitish sediment on the bottom of the flask was treated with sterilized normal salt solution, sterilized for half an hour at a time in an Arnold sterilizer for two days in succession; the sediment then failed to give a growth, by anaërobic or aërobic culture. Smears from this sediment gave characteristic rods, about one-half of the bacilli accepting Gram's stain, the other half decolorizing. The sediment was allowed to settle and was washed three times, the fluid being decanted each time.

Subcutaneous injections in guinea-pigs and rabbits were followed by no local effects; intramuscular injections also were negative. These results are in harmony with those obtained by Eug. Fraenkel.

CASE IV.—*Gaseous Phlegmon Following a Compound Fracture of the Right Tibia at its Upper Third.* This case occurred in the service of Dr. Bryant at St. Vincent's Hospital, to whom I am indebted for the permission to publish the case.

On December 17, 1896, the patient, a driver, slipped on the snow, and the wheel of the truck passed over his right leg. He was brought to the hospital in an ambulance. The leg was greatly swollen, ecchymotic, and gave signs of air under the skin just below tuberosity of the tibia. A compound comminuted fracture of the tibia was made out, and from the small wound venous blood continued to escape, even after pressure above had been applied. The thigh just above the knee was badly contused, and the knee-joint seemed to be full of fluid and air. Patient was in a condition of shock, and the foot was cold. Leg shaved at the wound, thoroughly irrigated with bichloride solution, dressed, and splints were applied. Elevation of leg and free stimulation.

18*th.* Considerable discharge of dark blood in the dressing. Temperature 101°; respiration 24; pulse 104 at 1 A.M. Temperature 104°; respiration 29; pulse 112 at 9 A.M.

19*th.* Temperature 104.6°. Leg greatly swollen, and several incisions were made, letting out a quantity of dark, offensively-smelling blood. Thorough irrigation with 1:100 carbolic solution, hot carbolic dressings being applied. At 1 P.M. temperature 106°; pulse rapid and weak.

Sponge baths to reduce the temperature, which went to 104.8° in half an hour. Under anæsthesia a few incisions in leg and thigh were made, from which a little blood and some gas escaped. Skin seemed to be filled with gas, little fluid or œdema being present. Drainage-tubes inserted, elevation of foot, and hot carbolic dressings. Free stimulation. Tissues around fractures were gangrenous and circulation in foot was poor.

22*d*. Patient's condition noted as improved. Several incisions were made in gangrenous part of leg, below the fracture, and continuous irrigation of carbolic solution was allowed to play on the leg. Patient restless and delirious.

23*d*. Amputation of leg at lower third of femur, anterior and posterior skin flaps being made. Little hemorrhage occurred. Marked weakness after operation. Circulation in leg was so feeble that the flaps were not sutured. The posterior flap was ecchymotic and nearly bloodless.

Temperature after operation 101.6°; respiration 18; pulse 118. Very restless and complained of intense pain at intervals.

24*th*. Delirious. Dressed twice daily.

26*th*. Takes nourishment and medicines. Wound filled with sloughy tissues and contains little or no blood.

28*th*. Died suddenly in the morning.

Temperature steadily rose from time of accident to its highest point —106° F., 1 A.M., December 19th. Course of temperature varied then approximately between 102° to 104° with diurnal variations.

Through the kindness of Dr. W. C. Lusk I was enabled to make the bedside cultivations, four days after the injury and a week before death of patient.

December 21, 1896, deep stabs in sugar-agar and a slant of glycerin-agar were made; the latter, grown aërobically, develops a pure culture of the staphylococcus pyogenes albus. The smears made at the bedside reveal cocci, not in great abundance, and longer and shorter thick rods with rounded ends staining positively to Gram.

The bacilli by Welch's method reveal beautifully stained capsules; by Loeffler's stain they appear somewhat granular.

Two of the four deep stabs gave a vigorous growth with marked gas production along length of the puncture, which is slightly yellowish in color, edges are fluted, and have dark granular spots. Smears reveal large bacilli with rounded ends. Chains of a dozen members are numerous, and also thinner rods of considerable length. Capsules were not demonstrable. No cocci seen on the smears. Four plates develop pure cultures of the bacillus aërogenes capsulatus. As the colonies resembled in every detail those seen in previous cases from organs, a description is superfluous. From some of the colonies smears revealed threads of various lengths more or less bent. These threads were never seen in previous cases, but resemble the threads obtained from the gaseous phlegmons of guinea-pigs. In smears made from some of these colonies capsules were demonstrable. The rods are absolutely immotile.

An emulsion in broth from one of the original stabs injected into a rabbit intravenously. Killed after a few minutes and body kept at 37° C. for twenty-four hours. Body is found much swollen; crepitation and gas are present in all organs, vessels, and subcutaneous tissues.

Smears made from different places reveal capsulated bacilli. The colonies on the pour plates refused to grow further on transplanting.

REMARKS ON SIMILAR CASES. It would extend the limits of this report to go into the literature of gaseous phlegmons, especially those cases in which the colon group has been isolated. A review of Fraenkel's[2] cases has been furnished by Welch and Flexner. Erdman[11] has reviewed and brought together the cases in which the bacillus aërogenes capsulatus was isolated from gaseous phlegmons, but does not include Fraenkel's four cases.

Fraenkel's bacillus corresponds closely with the bacillus isolated in my cases. Fraenkel's cultures at room temperature died in two or three days. He noticed a marked difference in the amount of fermentation, even in media made in the same way. Two per cent. agar interferes with the gas formation. Age of culture does not interfere with the gas production when planted on fresh media. In other cases, with daily inoculations, no gas was formed, a fact also observed by myself. In my experience the older the generation the less was gas produced. Contrary to Fraenkel, my sugar-agar cultures were the ones to develop most smell, and hydrogen sulphide was never formed. Slant blood-serum he recommends as an excellent medium. He did not observe spore formation on this medium, but mentions that he has found spores inconstantly on sodium formate. Gas and fetid decomposition of the serum were produced. Curiously enough, he finds nothing characteristic in the coagulation of milk, gas production being absent. After twelve weeks he was able to reinoculate from a gelatin-stab kept in room temperature, which has remained intact, and he claims that the virulence when tried on suitable media does not diminish.

As regards animals, the pig was the most sensitive. With mice no result. Intravenous injections in rabbits were negative. Subcutaneous injections in rabbits were not regularly attended with local lesions; the lesion produced is different from that observed in man. A rabbit received a twenty-four-hour-old agar culture. Next day there is formed at site of the inoculation an œdematous swelling. After forty-eight hours' swelling is tense and gives pseudo-fluctuation. The general condition of the rabbit unimpaired. Necrosis of skin over swelling occurs slowly and leaves a crater-like excavation, the edges of which are covered with a grayish necrotic tissue. Healing occurs with formation of scar tissue after weeks. Skin in neighborhood of abscess remains hairless. With pure culture no suppuration was ever present. In experiments in which the gas bacilli were injected in combination with streptococci and staphylococcus pyogenes aureus, softening of the muscles always occurs.

In animals the bacilli were never found in the organs, nor any changes microscopically. Dead bacilli, he says, do not protect or cause any local changes of the tissues in pigs, nor does one affection protect from another.

Case V.—Through the kindness of Dr. Dunham the writer was enabled to make cultivations from another case of "Schaumorgane," reported by him in the *Bulletin of Johns Hopkins Hospital.* The same bacillus was isolated, producing in pure culture, in the bodies of dead rabbits, identical post-mortem appearances. Subcutaneous inoculations in guinea-pigs were not made.

Case VI.—This case forms the subject of a report by Dr. Larkin[15] read before the New York Pathological Society. It was a case of hemorrhagic pancreatitis with multiple hepatic abscesses. Gas-holes were especially marked in the left lobe of the liver. Post-mortem eight hours after death. From the liver the bacillus aërogenes capsulatus was isolated.

To conclude, pure cultures injected in guinea-pigs subcutaneously often fail to produce any local effects. Only the most actively growing fresh cultures produced a fatal gaseous phlegmon. When the phlegmon breaks externally, the animal usually survives. Sections of the abdominal wall taken from the affected areas show that the process is one of necrosis principally. In no case was there any evidence of suppuration where pure cultures had been employed. The hemorrhagic fluid contains few leucocytes. The organs showed no marked microscopic lesions.

Injections of the hemorrhagic fluid of guinea-pigs into other guinea-pigs produced fatal phlegmons with regularity. Production of gas at site of injection was not infrequently seen in less than an hour after inoculation. Intravenous inoculations of pure cultures (in rabbits) were never followed by any effects. Intravenous injections in rabbits of the hemorrhagic fluid were usually followed by fatal results. As small amounts were injected, it is hard to believe that the fatal results could be attributed to the toxic effect of the serum, *per se.* It seems likely that the bacilli are able to produce much larger amounts of toxin in the body fluids, and to attain here a higher degree of virulence, than in artificial culture media. This conclusion seems justified, as pure cultures are much less virulent than the hemorrhagic fluid of guinea-pigs when injected into other guinea-pigs.

Attempts at filtering the hemorrhagic fluid were unsuccessful, the filters becoming clogged before more than a few drops had run through.

C. Fraenkel found that guinea-pigs which had recovered from the effects of previous gaseous phlegmons, on reinoculation succumbed as quickly as fresh guinea-pigs. The hope, therefore, of finding a protective serum seems not as yet justified.

The bacillus seems to be most widely distributed; but no one has, as far as my knowledge extends, undertaken to find out how often it is present in the intestinal tract, and it has not been found in nature. It has been assigned as the cause of peritonitis, being found in pure culture in the exudate in one of Welch and Flexner's cases. The cases of experimental peritonitis that have been produced by others were characterized by a similar exudate to that described by Welch and Flexner to be present in their case.

The writer cannot help expressing his lively anticipatory interest in the conclusion of the article of Welch and Flexner, which has yet to appear. There are many points referred to by the authors which have not as yet been elucidated.

In conclusion, I wish to express my deep sense of obligation to Dr. Prudden for his kind help and advice, which have always been at my service.

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3. TRAITÉ DE L'ALLAITEMENT ET DE L'ALIMENTATION DES ENFANTS DU PREMIER AGE. Par le DR. A. B. MARFAN. Paris: G. STEINHEIL, 1899.

(TREATISE ON NURSING AND FEEDING OF INFANTS. By A. B. Marfan, M.D.)

THE discussion of diseases of childhood is frequently based upon knowledge gained in the study of diseases of adults. This is manifestly improper, and the tendency of the day is, as it should be, toward a general recognition of the independent position of pediatrics. Authors who presume to write text-books or articles on diseases of children should base their observations upon facts learned in the study of the diseases of childhood, and not upon their general medical knowledge, with supplementation of statistical tables showing the frequency of diseases under discussion in early life. In some of the older text-books the omission of such occasional statistics would have justified a change of the title-page from "Diseases of Children" to "Practice of Medicine." The physiology and pathology of infancy and childhood must be studied apart from adult physiology and pathology. Pediatrics has won for itself an independent position, and to those who urge that there is a tendency in all branches of science toward generalization, as evidenced by such terms as comparative pathology, it may be replied that comparison and generalization cannot be undertaken until a mastery of special branches is accomplished. It is desirable, therefore, that text-books on pediatrics should be based upon careful study of the natural history of diseases of children. Text-books of the present day are, as a rule, more free from the fault alluded to than those of a decade ago; and it is because the books under review are commendably free from errors of this sort that we have been tempted to allude to their existence.

The second edition of Starr's *American Text-Book* is somewhat larger than the first, and includes several new articles: "Modified Milk and Percentage Milk Mixtures," "Lithæmia," "Orthopædics." Other chapters have been rearranged, revised, or rewritten. The number of authors, as in the first edition, is considerable; but the character of the work is nevertheless quite uniform. We are naturally attracted by the new articles. That on modified milk is of very great importance, and is a valuable addition to the work. Those who have followed carefully the increasing accuracy of knowledge regarding the composition and production of milk are, with every reason, convinced of the importance of such knowledge, and insist upon its application to the preparation of food for infants. The accurate and yet simple methods of milk analysis that have been elaborated by chemists have placed the physician in possession of facts regarding the composition of the normal human milk at different periods of lactation that demand greater accuracy in the preparation of artificial substitutes than has been possible in the past. More than this, the same methods have increased very materially our knowledge regarding the effects of altered composition of the milk upon the nutrition and health of children. The careful modification of cow's milk so as to conform as nearly as possible to the normal human milk at a certain period of lactation would seem, then, to be entirely reasonable, and the possibility of carrying out such modification with entire success cannot be questioned. The advantage of this method over the ancient methods of careless dilution and sweetening of cow's milk is undoubted. Dr. Westcott, the author of the article in question, is especially to be commended for the care he has taken to detail a plan for the "home-modification" of milk; for, though the milk laboratories now established in the large cities of this country and in England are available to many, the cost of the milk and the necessarily restricted field of operation of the laboratories limit their usefulness. Home-modification is, therefore, desirable, and the method suggested by Dr. Westcott will aid greatly in increasing knowledge regarding this important advance in scientific pediatrics. The article on lithæmia, by Dr. B. K. Rachford, is of great interest, though we cannot agree with many of the statements of the author, whose studies of kindred conditions in adults are well known. The solution of the pathology of gout and lithæmia has by no means been realized, and, however interesting certain theories may seem, it has not been shown by any means that the retention of the alloxuric bodies in the body-media is the cause or underlying pathologic condition. Those who believe in these theories will readily find cases like that cited by the author (page 95). A child, two days old, was greatly distressed and had a temperature of 104° F. for twenty-four hours. The urine was scanty and blood-tinged. After a warm bath, cathartics, and draughts of water, it began to improve, and urine which deposited uric acid was passed on the third day. Pathologists have long recognized the frequency of uric-acid infarcts in the renal tubules of the new-born, and clinicians have pointed out occasional anuria and distress as symptoms of difficult solution of such infarcts. No one, however, as far as our knowledge goes, has before ventured to regard these as other than quasi-normal conditions. We cannot enter into a consideration of the merits of the classification of various forms of lithæmia in childhood. It is not, of course, improbable that children suffer somewhat as do adults from this vague disorder, but the general opinion that lithæmia is an uncommon malady of childhood is undoubtedly well founded. The new section on orthopedics is eminently adapted to the needs of the general practitioner. In the revision of the article on vaccinia, reference to the supposed protozoon organisms recently described, and to the advantages of glycerinated lymph, would have been appropriate. The statement that fever may be occasionally present in the second stage of whooping-cough, but is, as a rule, absent, is not, according to our experience, entirely reliable. It is the teaching of text-books, but we have found the exceptions in which continuous fever is observed very numerous. We might select other statements, here and there, for criticism, such as the one that "the most commonly held opinion is that this poison [the cause of rheumatism] is lactic acid;" but the general character of the work is so satisfactory that we forbear to discuss questions of opinion. Some of the articles might be improved by the application of the thought we express in the introductory remarks of this review, though in general the authors write from the stand-point of specialists in diseases of children.

The small work of Dr. Williams is an excellent exposition of the medical diseases of infancy and childhood. Indeed, we are acquainted with no book of its size and scope that has pleased us so much. It is eminently adapted to the needs of the student and young physician seeking to learn the clinical facts regarding diseases of children. The subject of feeding of infants might with advantage have been stated more explicitly. This is a common fault of text-books. After reading over the chapter we fail to carry away any definite impressions of the best methods of procedure in the feeding of infants in general or in special cases. The classification and discussion of the diseases are in every way according to modern ideas; but the treatment of diseases might with advantage have been more thoroughly considered.

Marfan's work is an evidence of the importance the subject of infant feeding has attained. The author considers systematically in separate parts of his book: The Milk; Digestion and Nutrition of Infants, and Feeding. In the first part the chemistry, physiology, and pathology of milk, lactation, and nutrition are carefully discussed; and we note with especial interest the chapters on Substances which are eliminated by the Mammary Gland, and the Microbes of Milk. The question of transmission of infectious diseases is presented in a way that stamps the author as one who accepts advanced modern opinions, though the adverse evidence is not omitted. Cases of transmission of tuberculosis through milk are cited at some length. The discussion of artificial feeding, in the second part, deals extensively with the question of sterilization and Pasteurization, but less thoroughly with modification of cow's milk than we could wish. The author himself recommends a simple and, it seems to us, rather unsatisfactory method. He advises, during the first five or six days of life, milk diluted with an equal quantity of sterile 10 per cent. solution of sugar of milk; during the first four or five months, milk diluted with one-half as much sugar solution; thereafter pure milk moderately sweetened, unless gastro-intestinal disorders arise, in which case he again dilutes the milk with one-third or one-fourth as much sugar-water. A method of this kind would hardly be considered advanced and modern in this country. A. S.

MANUAL OF SKIN DISEASES. With Special Reference to Diagnosis and Treatment. For the Use of Students and General Practitioners. By W. A. HARDAWAY, M.D., Professor of Diseases of the Skin in the Missouri Medical College, St. Louis. Second edition, entirely rewritten and much enlarged. In one handsome 12mo. volume of 560 pages, with 40 engravings and 2 colored plates. Philadelphia and New York: Lea Brothers & Co., 1898.

THE revision of Dr. Hardaway's manual has been so thoroughly and well done as to make a practically new book of it. The alphabetical arrangement employed in the first edition has been abandoned, wisely, we think, for the classification of Hebra as modified by Crocker, this system being regarded as the one best adapted to teaching purposes, out of the many proposed. While fully recognizing the desirability of a rational system of classification, the author makes a plea for a more uniform system of nomenclature, believing this much more urgently needed than new systems of classification; and we are heartily in accord with him in this opinion.

The book is an eminently practical one, but little space being devoted to matters purely theoretical. The clinical features of cutaneous disease are clearly and accurately described, and the directions for treatment are sufficiently full and altogether judicious. A noticeable feature of his edition of the *Manual* is the exceeding thoroughness with which the subject-matter has been brought up to date, all the newest views and discoveries in dermatology finding brief but appropriate mention.

That much discussed disease, seborrhœic eczema, is given a place apart from the other forms of eczema, the author apparently not yet having made up his mind as to the exact place this malady ought to occupy.

We note that the treatment of psoriasis by large doses of iodide of potassium, as advocated by Haslung, is not looked upon with favor; indeed, it is regarded as dangerous. This seems to us an excess of caution hardly justified by experience. There is no doubt that, in a certain proportion of cases, this treatment is very effective; and the number in which it produces serious ill-effects is certainly a very small one.

We notice with some surprise, in a book otherwise so entirely modern, that lupus vulgaris and the scrofulodermata are not described in the section upon tuberculosis of the skin; but the old classification is retained, and they are treated in separate sections, as if they were something other than tuberculous, the author's reason being that they differ clinically from the other more distinctively tuberculous affections of the skin. This reason is, to our mind, altogether insufficient for thus separating lupus vulgaris at least from the other forms of tuberculosis cutis. While it may be desirable to retain the old names, to avoid confusion, it ought to be made clear to the student that, by whatever names these affections are called, and however much they may differ among themselves in some of their clinical aspects, they are etiologically identical—they are all tuberculous and are to be treated as such.

A number of illustrations have been introduced in this edition, but they are of doubtful value in the elucidation of the text, since they are, to say the least, of indifferent quality.

The new edition is, all in all, a very great improvement over the first one, and in its present shape the manual is one of the very best among the smaller treatises upon diseases of the skin, is thoroughly up to date, and is sure to be found useful by both the student and practising physician. M. B. H.

AN INTRODUCTION TO PATHOLOGY AND MORBID ANATOMY. By T. HENRY GREEN, M.D., F.R.C.P. Revised and enlarged by H. MONTAGUE MURRAY, M.D., F.R.C.P. New (eighth) American edition, thoroughly revised from the eighth English edition, by WALTON MARTIN, PH.B., M.D. Illustrated with 216 engravings, of which 6 are in colors, and a colored plate. Philadelphia and New York: Lea Brothers & Co., 1898.

GREEN'S pathology has passed through almost as many editions as the masterwork of Ziegler, a proof of its great popularity. We had occasion to review the book in its seventh edition for another journal several years ago, and found then considerable to criticise. The American editor of the present edition has, however, greatly improved the work and has brought it fairly well up to date. The classification has been considerably changed and for the better. The first part, General Pathology, is divided into disturbances of the circulation, regressive and progressive changes, vegetable parasites, animal parasites, this being a chapter newly added; infective granulomata, septicæmia and pyæmia. Inflammation is treated in an interesting way, and due attention to recent advances is given. The classification of tumors is based on their origin from the layers of the blastoderm, with the result that carcinomas and adenomas are stated to be derived exclusively from the epiblast and hypoblast, notwithstanding the fact that a number of these tumors, as in the uterus and ovaries, grow from epithelium of mesoblastic origin. The divisions of cancer are somewhat antiquated, but the features of the various tumors are clearly described. In the subject of bacteriology, we notice, with some surprise, the statement that no case of erysipelas from inoculation of a wound with pus containing streptococci seems to have been recorded. Several of such cases, if our memory serves us rightly, have found their way into the literature. The special pathology of organs is discussed briefly and concisely; some sections have, perhaps, received too scant consideration, as, for example, the stomach, which is disposed of in less than two pages.

There is a peculiar charm about the style of the book. Its diction is superior to that found in the ordinary text-book. The typographer's work is also excellent. The original illustrations are nearly all very good, and the editor has very wisely added a large number of excellent cuts from the best German text-books. In its transformed state we can recommend Green's *Pathology* as a valuable and useful book for students. D. R.

A TEXT-BOOK OF PATHOLOGY. By ALFRED STENGEL, M.D. With 372 illustrations. Philadelphia: W. B. Saunders, 1898.

A GOOD text-book on pathology in the English language has long been the *pium desideratum* of teachers and students. While there are many works on pathology in our language, there are few that are thoroughly imbued with the modern trend in pathologic science. No branch of medicine is more active or more progressive than pathology, and earnest study and patient effort are required to keep abreast with the vast literature which emanates from the laboratories of all lands. The author of the book before us has produced a work not only of marked individuality, but one which very nearly realizes the hopes of those who have longed to see a good English text-book on this subject. That the author should be an American is a cause of just pride. The division of the book is that adopted by Ziegler and the best German writers, namely, into general and special pathology. After a brief chapter on etiology and the disorders of nutrition, the disturbances of the circulation of the blood, and retrogressive and progressive tissue changes are taken up. Recognizing the difficulties attending all attempts at classifying tumors, the author has entirely avoided their classification. A classification of tumors is, however, very desirable, and we regret that the author did not attempt it. The various tumors are clearly described, both macroscopically and microscopically. The angiosarcomata have not received perhaps as exhaustive a consideration as their importance demands. A most satisfactory chapter is that on bacteriology, which contains in concise form the important details regarding bacteria and the diseases they produce, and gives evidence of a thorough knowledge on the writer's part of the latest investigations. The meningococcus of Jaeger-Weichselbaum seems to have escaped notice, but is mentioned later, though somewhat briefly, in the section on meningitis.

The part devoted to special pathology deals successively with diseases of the blood, of the lymphatic tissues, of the circulatory system, of the respiratory system, of the gastro-intestinal tract, of the ductless glands, of the urinary organs, of the bones, the joints, and the muscles, and of the nervous system. Diseases of the eye, the ear, and the skin have been omitted, the author holding, as he states in the preface, that they more properly belong to special works. All of the chapters of the special part give proof of the author's practical acquaintance with pathology in the post-mortem room and in the histologic laboratory, as well as of his intimate knowledge of the literature. By closely adhering to a uniform plan of treating the diseases of each organ and by the adoption of display-type, the author has materially lightened the labors of the student. The chapters on the Diseases of the Nervous System merit special praise; they are thorough and show an admirable mastery over that most difficult and intricate subject in pathology.

The book is profusely illustrated by good original and well-chosen borrowed cuts. The introduction of numerous photographs of living patients to illustrate macroscopic lesions is commendable.

We do not hesitate in predicting that the work will be one of the most popular books published in recent years. D. R.

Artificial Anæsthetics. By Laurence Turnbull, M.D., Ph.G., Aural Surgeon to the Jefferson Medical College Hospital, Philadelphia, etc. Fourth edition. Revised and enlarged. Pp. xxiv. 550. Philadelphia: P. Blakiston, Son & Co.

This manual of anæsthetic agents and their employment in the treatment of disease has deservedly reached its fourth edition, for it contains what is necessary to be acquired by every student of medicine who wishes to have a thorough and exact knowledge of anæsthesia. That this knowledge is not insisted upon by the schools for undergraduate medical students is shown by the every-day history of medical and surgical practice. A single hour in the operating-room of a large hospital would demonstrate the absolute ignorance and gross carelessness of the average junior assistant. If argument were wanting as to the comparative safety of ether or chloroform, the fact that death under anæsthesia is very infrequent in this country would furnish it. It is the duty of the schools to see that no one is graduated unless he has passed a theoretical and practical examination upon this subject. Until this is done the pernicious example of the present will continue to have its influence upon the future house staff. The marked safety of ether has been sufficiently demonstrated so that the anæsthetizer need not feel that it is incumbent upon him to prove that it is extremely difficult to kill a patient while under its influence. This book is not for the undergraduate to read; it is his duty to study it. We wish that this edition had been rewritten instead of being revised, for, as it now stands, it seems uneven. If we were disposed to be critical we might wish that it had been more thoroughly revised and such errors as these eliminated: $NG—N_2O$ (p. 41), and $No — N_2O$ (p. 69) for $NO — N_2O$; $C_2H.Br$ for C_2H_5Br (p. 227); CINH for C_4I_4NH (p. 468); CH for $C_{10}H_8$ (p. 485), which, by the way, appears as naphthaline instead of naphtalin; and $C_{20}H_5OH$ for C_2H_5OH (p. 489). The paragraph on page 201, devoted to methylic ether, is remarkable for the amount of misinformation which it contains: neither the chemical formula, synonym, nor method of preparation is correct. Vernuil (page 230 and index) and Bandeun (page 442) are new names for old acquaintances, and *soporo,* "meaning natural sleep" (from the Latin), is certainly not of the time of Cicero. And although the author is quoting a circular lauding a nostrum, yet he should have shown that the derivation of the name was misleading equally with the rest of the announcement. While we may not altogether agree with Laborde, we think that the review of his method of lingual traction is unnecessarily severe (page 282). We commend the Student's Summary (page 488 *et seq.*) and the Legal Responsibility of Physicians (page 516 *et seq.*) for their conciseness and practical application. We are pleased to welcome the old friend of our student days and to commend it to the thoughtful student of the present time. R. W. W.

ATLAS AND ESSENTIALS OF BACTERIOLOGY. By PROF. K. B. LEHMANN, Chief of the Hygienic Institute in Würzburg, and DR. RUDOLF NEUMANN, Assistant in the Hygienic Institute in Würzburg. With 63 chromo-lithographic plates, comprising 558 figures, and numerous engravings. 8vo. pp. viii. 204. New York: William Wood & Co., 1897.

EVERY worker in the vast field of bacteriology is at times confronted by doubt as to the nature of some germ which he may have encountered for the first time. He believes it to be identical in its characters as determined by him with some species of which he may have a description; but a measure of doubt remains, for the complete removal of which he must have access to a standard culture of the germ in question. Only by careful comparison of the growths obtained by him on the various culture media with those of the standard germ can he in all cases finally determine the identity of his own.

Few, however, are so fortunate as to have access to a collection of bacteria of sufficient size and reliability to meet all requirements of this sort, and to those who have not, the *Atlas of Bacteriology* before us affords the next best resort. Indeed, in many instances the plates contained in it give almost as helpful information of the various biological characters of the germs they represent as do the cultures themselves. This is due in part to the large number of illustrations given of each germ—its growth on gelatin and on agar, both in surface and stab-cultures, on potato and in plates, as well as its minute morphology being given in most cases—but even more to the excellent reproduction of color and relief effects. No artificial representation can be expected to reproduce fully the picture of living cultures, but in the present plates we find an approach thereto almost beyond expectation. This is undoubtedly due to the fact that in the preparation and printing of the plates the greatest care has been exercised in the selection of the colors, no effort having been spared to make the final result approximate the original as nearly as possible. To obtain this we are told that in some instances as many as twenty-one separate and distinct color impressions have been required to produce a single plate.

The volume also comprises a very considerable collection, more or less complete illustration being afforded of about eighty different species, including all those of pathological importance.

Finally, the descriptions of the plates are ample, and are conveniently arranged on pages fronting the plates to which they respectively refer.

While the great usefulness of the volume is in its plates, we must mention also a brief but excellent statement of the general biological characters of the bacteria as a group. This occupies about 100 pages, and is followed by a "Technical Appendix," in which the various methods of studying the bacteria are detailed. An index completes the volume.

J. S. E.

ATLAS OF EXTERNAL DISEASES OF THE EYE. By A. MAITLAND RAMSAY, M.D. With thirty full-page colored plates and eighteen full-page photogravures. Glasgow: James MacLehose & Sons; New York: The Macmillan Company, 1898.

SINCE the publication of the works of Demours, von Ammon, Dalrymple, and Sichel—that is, from 1818 to 1859—there has been little attempt to portray in colors the external diseases of the eye, if we except Salzmann's edition of Jaeger's *Hand-Atlas* and the treatises of Henry E. Juler and George A. Berry, all of which contain a certain number of colored plates descriptive of external ocular disorders. Therefore, it is with much interest that one turns to Haab's *Atlas der Äusseren Erkrankungen des Auges* and Ramsay's *External Diseases of the Eye*, which appear almost simultaneously, as notable contributions to ophthalmic literature.

Although, as announced, Dr. Ramsay's *Atlas* contains thirty full-page colored plates and eighteen full-page photogravures, this statement does not give an adequate idea of the wealth of illustration, because most of the colored plates contain several chromo-lithographs, in all one hundred and thirty, which, added to the eighteen photographs, make a total of one hundred and forty-eight illustrations.

The photographs are excellent, and with perhaps a single exception (chronic glaucoma) give well-nigh perfect pictures of the diseases they are intended to represent. Particularly admirable are those illustrating ptosis, œdema palpebrarum, and exophthalmic goitre.

It would be absurd to expect among one hundred and thirty chromo-lithographs equal excellence, but it is not too much to say that there are few poor ones in the collection, and from the majority a diagnosis of the ocular condition could be made almost as readily as if the disease itself were present in the living eye. The reviewer extends his hearty congratulations to author and publisher upon the excellence of the reproductions.

There is a fairly full discussion of all of the diseases that are portrayed. Indeed, to quote the preface, Dr. Ramsay has "endeavored to make the letter-press not only descriptive of, but also complementary to, the plates, so as to give as faithful a clinical picture as possible of all of the diseases dealt with," and he has succeeded admirably. We regret, however, that a paragraph on the most essential treatment of each disease is not added. To be sure, treatment is incidentally mentioned here and there, but nowhere systematically recorded. Now, while it may be argued that an atlas is not a book on therapeutics, such an atlas is primarily intended—as, indeed, the preface distinctly states—for those whose opportunities are not sufficiently great to bring them in contact with much clinical material; and while we do not for a moment doubt that it will be of great aid to such practitioners in diagnosis and clinical study, it would be of still greater aid if the therapeutic measures suited to the diseases described were recorded; and we know no one who could have supplied this want more accurately than Dr. Ramsay. In this respect Haab's *Atlas* will be a serious rival, as in addition to very excellent illustrations and descriptive text it contains sections devoted to prognosis and therapeutics.

Ramsay's *Atlas* will be useful not only to the practitioner who is not constantly brought in contact with cases of ocular disease, but to the student and to him who teaches the student. Indeed, the book is the outcome of illustrations which Dr. Ramsay used in his lectures on diseases of the eye at Queen Margaret College. We congratulate the students who listened to those admirably illustrated lectures. The reviewer can testify from personal experience that the book is an aid in demonstrating to classes, and recommends it to practitioner, student, and teacher.

G. E. de S.

Aphasia and Other Speech Defects. By H. Charlton Bastian, M.A., M.D., Lond., F.R.S. New York: D. Appleton & Co., 1898.

Perhaps no one is better fitted to deal with speech defects than is the author of this book, and certainly no one has given us a more comprehensive view of the subject. Many of the chapters have appeared before in the columns of *The Lancet*, but much new material has been added.

All defects of speech are classified under two general heads, namely, those due to subcortical and those due to cortical lesions. Still two other divisions are made of the first class, and in the one are put those defects due to lesions in the bulbar and spinal motor-centres, and in the other those due to lesions in the pyramidal system of fibres.

The defects coming under the head of the first one of these subdivisions are called anarthria or dysarthria, and those under the second are called aphemia, while aphasia is the term applied to those due to cortical lesions. This is a very satisfactory classification, and it opens the way to a simpler nomenclature than has been employed hitherto in treating of this complex subject.

The author holds that there is no special "centre for concepts," and also argues against the existence of distinct topographical speech-centres. He also makes out a fairly clear case in favor of the motor-centres of speech being in the bulb and spinal cord rather than in the cortex. The so-called "motor-centre of Broca" the author names the "glosso-kinæsthetic centre," and he believes it to be not a motor, but a sensory centre, the function of which is to "guide" movements for speech. This is a point not easily proved, but there seems to be no good reason for supposing the existence of a cortical motor-centre for speech when all the phenomena may be explained without such supposition.

The author claims to be the first to discover and name the "kinæsthetic" centres. It is in these that the memories or impressions of the movements for spoken and written language are stored up. These centres, the "glosso-kinæsthetic" for spoken and "cheiro-kinæsthetic" for written language, are employed in the expression of thought rather than in the thought-process itself. The book deals with the acquired defects of speech only, and contains thirty-one illustrations. The histories of one hundred and fourteen cases are also given, illustrating the different kinds of defects, and in many of the cases necropsies were performed, which alone can give much weight to the conclusions. It is probably the most up-to-date work we have on this important subject.

G. H. M.

THE POCKET THERAPIST. By THOMAS STRETCH DOWSE, M.D., Fellow of the Royal College of Physicians of Edinburgh, etc. Pp. 192. Bristol: John Wright & Co., 1897.

THE sub-title reads: "A concise manual of modern treatment for students and junior practitioners, arranged alphabetically for ready reference." The first one hundred and seventy-five pages take up the treatment of all sorts of morbid conditions from abortion to worms. We hope that the newly-fledged practitioner knows as much about the treatment of certain diseases as this book tells him; he certainly should if his school has done its duty. On the other hand, this may be a reminder of matters forgotten. If the work has any value, it is a record of those measures which the author has found to be valuable;

he has left unnoticed those found to be useless. The suggestions show an acquaintance with recent literature, if erythrol tetra-nitrate and eucaine are evidence. Sometimes they seem trivial, as a two-grain quinine pill, thrice daily, for bromidrosis; or are misleading, as "for attacks of dyspnœa and angina, trinitrin should be tried, or nitroglycerin." The author seems to think it his duty to warn the above-mentioned junior as to new remedies; of some he will imagine their origin, as chinosol, valsol—be it ichthyol, menthol, salicylic, chloroform—camphor, iodine, or iodoform, or iron jelloids, while others may not be very familiar, as Fletcher's vibrona, emol-keleet, or jugum penis for enuresis nocturna. One remedy is frequently recommended, and it is to be obtained in Cannon Street, E. C. It is branalcane, and is supposed to benefit bromidrosis, cancrum oris, croup, diphtheria, gangrene of the lung, fissure and pruritus of the anus, stomatitis, both plain and aphthous, hay-asthma, leucorrhœa, and sore-throat. We wish that we could indorse the author's commendation, but we cannot, for the text-books and even the advertising pages of the journals are silent as to its composition. In the mean time it seems that it might be useful to the orificial surgeons, and their attention is respectfully directed to it. The remainder of the book is devoted to health-resorts, poisons and their antidotes, metrical measures, the urine, sputum, method of staining tubercle bacilli, vomit, feces, and therapeutic serums.

Books of this order should have a very limited use; we fear that they are incentives to indolence. We regret that the author has written this; he is worthy of far better things. R. W. W.

RETINOSCOPY (OR SHADOW TEST) IN THE DETERMINATION OF REFRACTION AT ONE METRE DISTANCE WITH THE PLANE MIRROR. By JAMES THORINGTON, M.D., Adjunct Professor of Diseases of the Eye in the Philadelphia Polyclinic and College for Graduates in Medicine, etc. Second edition, revised and enlarged. Thirty-eight illustrations, twelve of which are colored. Philadelphia: P. Blakiston, Son & Co., 1898.

THE study of retinoscopy by the plane mirror by students interested in acquiring proficiency in this essential objective method of estimating refraction errors received a decided impetus from the publication of the first edition of Thorington's work, and we do not hesitate to say that the beginner in ophthalmology has found great aid and benefit from its perusal. It presents the subject plainly, clearly, accurately, tersely; and careful reading, together with the application of its principles to clinical cases, will do much to familiarize the student with the essentials. In no other book are the principles of retinoscopy so well taught, and with such practical bearing, as in this work of Thorington, and it is with the greatest pleasure that we heartily recommend the second edition to every refractionist. The book is well bound, well printed on good, thick paper, and thoroughly well illustrated.

H. F. H.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

WILLIAM OSLER, M.D.,
PROFESSOR OF MEDICINE IN THE JOHNS HOPKINS UNIVERSITY, BALTIMORE, MARYLAND,

AND

GEORGE DOCK, M.D.,
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Concerning the Coagulation Action of Gelatin on the Blood.—L. Camas and E. Gley (*Société de Biologie*, November 18, 1898) state that Dastre and Floresco showed that the coagulation of dogs' and rabbits' blood is considerably increased by the injection of a 5 per cent. solution of gelatin into their veins. They then ask the question: Is the same result to be expected to follow subcutaneous or intraperitoneal injections? *A priori*, they hold that there is every reason to doubt that it does.

Lancereaux and Paulesco conducted a series of experiments on rabbits in connection with the former's method of treating aneurisms by gelatin injections. They found that the rapidity of coagulation of the blood was increased by 100 c.c. of a 2 per cent. gelatin solution into the animal's peritoneal cavity.

Camus and Gley made intraperitoneal injections of gelatin in rabbits in three cases, and in every instance the coagulation time of the blood was delayed. They believe that the absence of an increased rapidity of coagulation is due to the gelatin being non-dializable. They believe that when gelatin, injected subcutaneously, disappears after several hours it does not enter the vessels as such, but first undergoes a modification of the nature of a digestive process.

The Effect of the Injection of Salt-Solution and Gelatin.—At the session of the Paris Academy of Medicine held November 29, 1898, the subject of the capability of the organism to absorb gelatin and its effect on the coagulability of the blood was again under discussion.

Lancereaux, contrary to the opinion of M. Laborde, held that gelatin is soluble in artificial serum and is not precipitated at the temperature of the body. Moreover, many non-dializable substances, such as sero-fibrinous effusions, œdematous and ascitic fluids, are capable of being absorbed by the organism.

His experiments had unquestionably shown that gelatin injections augmented the coagulability of the blood, and that the quantity of gelatin in the peritoneal cavity several hours after the injection was considerably less than the amount originally introduced. From this it must be concluded that some of the gelatin was absorbed. He held that the opinion advanced by Laborde, that peptonization of the gelatin was necessary before absorption could take place, was purely hypothetical.

Laborde, in reply, stated that the results of recent experiments had confirmed his earlier ones in that he found that practically no gelatin was absorbed after its injection into the peritoneal cavity. He held, however, that at the end of a certain time it may disappear, owing to its undergoing peptonization and absorption. He believed that any action the gelatin possessed was due to its conversion into peptone. Laborde stated that the determination of the coagulability of the blood presented the greatest difficulties, because it varied markedly from one moment to another without any regularity, and was so readily influenced by faulty technique. He believed, then, that no precise conclusions could be drawn from Lancereaux's experiments on the coagulability of the blood.

Hayem took part in the discussion, and stated that, although he had had a great deal of experience in the determination of the coagulability of the blood, his results had been so variable and contradictory that he was forced to lay them aside. He did not agree with the view of Laborde that for a substance to be absorbed it must be dializable. In support of his view he cited the observation that if dogs' blood be injected into the peritoneal cavity of the goat the red cells of the former, which are larger than those of the latter, are found in the circulating blood of the goat after four or five hours.

Laborde objected to Hayem's argument, because in this case one has to deal with a living body, the red blood-corpuscles; whereas gelatin is an unorganized and non-dializable substance.

[During the past three months the injections have been used in five cases of aneurism in my wards. In one the first injection caused so much pain that the patient refused further treatment. One patient died (after about five injections) of hemorrhage. Of the remaining three cases in which the injections have been given systematically one is decidedly better; two present no changes.—W. O.]

The Effect of Turpentine Inhalations in Experimental Tuberculosis.—J. Héricourt and Charles Richet (*Société de Biologie*, November 18, 1898) at the session of the Société de Biologie on November 12, 1898, gave the results of their experience with the use of turpentine inhalations in the treatment of experimental tuberculosis in dogs. The administration of the drug by inhalation is preferable to that by subcutaneous and intravenous injection or to administration by the mouth, for various reasons. It does not require an operation, the drug is brought into direct contact with the bacilli in the lungs, and the dose can be carefully graduated until nearly a poisonous dose is reached.

Their procedure was to place the dogs in a box through which air charged with turpentine vapor was passed. They were kept in the box for one hour, and during this time 1200 litres of air charged with 12 grammes of turpentine were passed through it. The inhalations were given every fourth day from March 14th to August 2d.

In order to compare this method of treatment with some others they inoculated eleven dogs on March 2d with a tenth of a cubic centimetre of a three-months' culture of human tuberculosis. Three dogs were not treated, and they died on the twentieth, twenty-seventh, and forty-ninth days after inoculation, respectively. Three others were treated by intratracheal injections of iodine (0.015 gramme to the litre), and two died on the twenty-fourth and sixty-sixth days. With two of the dogs intravenous injections of turpentine were used, and they died on the forty-fifth and eighty-fourth days. The turpentine inhalations were used in the remaining three dogs, and only one died, death occurring on the twenty-fourth day. The other two dogs were alive and healthy at the time their report was made, two hundred and fifty-one days after inoculation. The turpentine inhalations had thus given by far the best results. They claim that the success of this treatment is emphasized by the fact that in not a single instance out of two hundred dogs inoculated during a period of ten years and allowed to go untreated had the animal lived longer than six months.

The series of animals in which they had tested this treatment is unfortunately too small to draw definite conclusions from. The practical importance of their work rests in the possibility that similar turpentine inhalations may also be of value in the treatment of human tuberculosis.

The Inoculation Theory of Malarial Infection.—BIGNAMI (*The Lancet*, December 3 and 10, 1898), in a most interesting article on the mode of conveyance of malarial infections, refers to a previous communication in the same journal for 1896, in which he held that it was very improbable that malarial infections were conveyed either by water or air. In the same article he expressed the opinion that "malaria behaves itself with regard to man as if the malarial germs were inoculated by mosquitoes." Great stress was attached to one argument in favor of the inoculation theory, viz., its analogy to the Texas cattle fever, in which Smith and Kilborne had demonstrated that the infection was conveyed by means of the tick. Bignami then refers to Manson's discovery of malarial flagellæ in the bodies of mosquitoes and to his view that these bodies represented the extracorporeal life-cycle of the malarial parasite. He cites the important discovery of Ross that the gray mosquito is capable of transmitting the halteridium-Labbê from sparrows whose blood contained this organism to uninfected birds.

In 1894 Bignami and Dionisi conducted some unsuccessful experiments with the view of determining whether the mosquito was capable of conveying the disease. Bignami does not think that the negative results discredit the hypothesis, as he believes that the proper species of mosquito was not used.

Laveran, in the last edition of his work on malaria, merely alludes to the inoculation theory. Koch, while not bringing forward any proof in support of the view, recently expressed the opinion that the malarial parasite has the same relation to the mosquito that the parasites of Texas fever have to the cattle-tick.

Bignami, in approaching the subject anew, sought to obtain indirect proof of the mosquito inoculation theory by protecting a certain number of individuals from mosquito bites by the use of netting, etc., and to expose a corresponding number to the ravages of the mosquito. If the protected persons remained free from malaria and a certain number of the unprotected developed the disease, this would afford indirect proof on the side of the inoculation theory. This experiment, however, had to be given up, owing to the difficulties encountered in carrying it out.

He then determined to resort to the direct method of investigation by endeavoring to show that patients bitten by mosquitoes obtained from a highly malarious district acquire the disease. In order to fortify any positive results he might obtain it was necessary that certain conditions should be secured. The experiment should be carried out in an environment known to be non-malarious; the individual experimented upon must not have had malaria, and must have lived in a hospital under medical supervision for as long a time as possible; and the experiment should be conducted for several weeks, during which time frequent renewals of mosquitoes must be made.

These conditions were all present in the case in which the experiments were successful; in fact, the patient, a nervous case, had never been outside of the wards of the Santo Spirito Hospital in Rome for six years, during which time he had been under Bastianelli's care. Grassi had shown that malarious districts are infested with a certain species of mosquitoes never found elsewhere. During the experiment, which began on September 26th, a competent person collected three species of adult mosquitoes daily from pools in highly malarious regions of the Roman Campagna. Thus there was a supply of adult mosquitoes placed in the "mosquito-room" in which the patient slept each night. He was severely and frequently bitten. On October 1st his temperature became elevated, and he had marked chilly feelings. These persisted during October 2d, and he was given quinine subcutaneously in the afternoon. On October 3d, about forty hours after the onset of the fever, a blood examination revealed young amœboid hyaline intracellular malarial parasites. Later in the day parasites were found containing pigment and presenting the characteristic features of æstivo-autumnal parasites.

Bignami thinks that this experiment affords, for the first time, practically absolute proof that malarial infections are conveyed by the bites of mosquitoes.

As to the species of mosquito that conveyed the infection, Bignami thinks that either the Culex penicillaris or the Culex malariæ (Grassi) were the most likely ones. These, with the Anopheles claviger, are believed by Grassi to be found only in malarious districts.

Finally, Bignami states that malaria is a disease which is contracted by inoculation—a fact of which we have now the first experimental proof. He claims, further, that everything points to the conclusion that inoculation is the only way by which infection is acquired, since air and water as carriers of infection may be excluded, and because arguments based on analogy all tend in the same direction. This much at any rate we can assert, namely, that inoculation is the only mechanism of infection which has been demonstrated experimentally.

On the Structure of the Semilunar and Flagellate Bodies of Malarial Fever.—Bignami and Bastianelli (*The Lancet*, December 19, 1898), in reporting the results of their study of the structure of flagellated malarial parasites, refer to Manson's view that they represent parasites in sporulation, the spores of which, "in the interests of the extra-corporeal life of the plasmodium," take on this special form of mobile and flagellated filaments. Grassi and Feletti had previously advanced the opinion that they represented nothing but the dying forms of the parasite, and pointed out that no one had hitherto demonstrated in these filaments the structure which ought to be found in spores, namely, chromatin. Sacharoff, subsequently, in studying the internal structure of the flagellates of crows, considered the flagella as chromosomes originating in the nuclei of the body of the parasite, and flagellation as a process of perverted karyokinetic division accomplished in a violent manner.

During the summer of 1898 Bignami and Bastianelli investigated the structure of the crescents and their derivative flagellate bodies, and the flagellates derived from the tertian organism. For this purpose they used the Romanowski method of staining. As a result of their study they found that in the majority of flagellates the flagella consist essentially of a filament of chromatin well brought out by the Romanowski method. The flagellates derived from the crescents and pigmented tertian bodies do not all present the same details of structure. A moderate number present the appearance of a protoplasmic body containing in its mass some filaments or blocks of pigment. From the protoplasmic bodies of these forms there usually project four flagella, apparently entirely made up of protoplasm and containing no chromatin. Then there are other flagellate bodies—and these are more numerous—which possess a pigmented protoplasmic body in which the particles of chromatin have emigrated to the periphery. From these peripheral chromosomes issue filaments of chromatin which form the principal part of the flagella. This form generally has four flagella as well. Finally, there are a few flagellates, some flagella of which contain chromatin, while others consist of protoplasm alone. In the rare instances in which they were able to find an isolated stained flagellum it always appeared as though the chromatin occupied the centre and was covered by a peripheral layer of protoplasm. The chromatin in these flagella was quite definitely shown to be derived from the nuclei of the parasites. Bignami and Bastianelli do not mention the importance of the presence of chromatin in the flagella and its bearing on the fertilization process observed by MacCullum to take place in human and avian malarial parasites. They hold that the crescents are sterile bodies in man and as far as man is concerned. Further, they had previously forwarded the hypothesis that the crescents represent those phases of the life of the malarial parasite which in other parasites are continued and completed outside the host. This hypothesis had received confirmation, from the observation of Ross, Grassi, and themselves, that the crescents do actually develop in the middle intestine of the mosquito (Anopheles claviger).

Hypertrophic Cirrhosis of the Liver, with Enlarged Spleen and Icterus, in Three Children of the Same Parents.—Hasenclever (*Berliner klin.*

Woch., 1898, No. 45) reports an interesting observation. The father had no history of syphilis, but had apoplexy when thirty-two years old. The liver disease appeared in the children at the ages of eighteen, twenty, and sixteen years. All had chronic enlargement of the liver, constant and intense jaundice, early appearance of enlarged spleen, and no evidences of portal congestion. The disease came on with remissions and exacerbations. The three patients showed very defective growth as compared with a healthy brother and sister of nearly the same ages, and a sister of four years. There had also been one abortion and three early deaths in the family. The patient first attacked died after a profuse gastric and intestinal hemorrhage. There was no ascites. The enlarged liver showed no scars, but was hob-nailed. There were no peritoneal adhesions. Microscopical examinations showed thickening of the capsule and an interacinous growth of connective tissue of somewhat irregular distribution, with hypertrophy and atrophy of the liver-cells, and but little new growth of the biliary ducts. The bile capillaries contained fine granular concretions and the liver cells much yellow and brown pigment. The author discusses the various etiological possibilities, leaning, with evident justice, to the theory of inherited syphilis. He suggests that the faulty development of the patients was due to inherited syphilitic disease of the liver, which latter ultimately showed itself as hypertrophic cirrhosis.

Hysterical Paroxysmal Œdema.—EDGEWORTH (*Bristol Medico-chirurgical Journal,* September, 1898, p. 206) reports three cases of paroxysmal localized œdema.

The first case was a man, aged twenty-four years, who gave the history that he would go to bed quite well, and awake in the morning to find that some part of the body, the foot or leg, arm or hand, often the face, and rarely the trunk, had become markedly swollen. This would last all day, and gradually subside. There was a burning, itching pain in the slightly red, swollen part, which could not be indented by the finger. There was no anæsthesia, analgesia, or thermo-anæsthesia of the skin in either the affected or the normal parts. The patient was observed in several repeated attacks. In one attack the lips and the left side of the face were involved. There was no family history of any similar affection. The case was treated by arsenic in increasing doses, and the attacks became less acute and occurred only at greater intervals.

In reviewing the distribution of the areas of œdema in this case, Edgeworth decides that they were very similar to the alterations in sensibility in some cases of hysteria. The case was considered one of vasomotor neurosis, of cerebral and probably cortical origin.

A second case, a man, aged twenty-two years, had during twelve months been troubled with localized swellings of the hands, or hands and forearms, or feet. These would last twenty-four hours and then subside. In one of the attacks in which one of the hands and forearms were involved, the affected area corresponded accurately with that covered by a high-buttoned glove. In this attack the skin affected by the œdema, and for some distance above it, was partially anæsthetic to touch and to heat and cold, and totally analgesic to the prick of a pin.

In this case the fact that the area of the disturbance of sensation was not limited to the area of œdema alone suggested strongly that the condition was of an hysterical nature.

The third case was that of a woman, aged thirty-seven years, who would be awakened between 2 and 3 A.M. by a numb pain in the left arm, and find that the arm from the shoulder downward was slightly hot, not red, but felt heavy. She would fall asleep again, and by morning the swelling would almost entirely have disappeared. In this case there were almost complete analgesia and thermo-anæsthesia, while tactile sensibility was normal.

Sydenham first described an hysterical œdema. It is rarely an isolated phenomenon, generally coexisting with arthralgia, paralysis, or contracture. While its duration is variable, it is usually a most persistent phenomenon, and may last for years.

The cases reported by Edgeworth differ from these, more especially in their paroxysmal type, though otherwise they are similar. During recent years a disease has been differentiated, to which various names have been given: angio-neurotic œdema, paroxysmal œdema, vasomotor œdema, and Quincke's œdema. The disease has been well described by Osler. It is characterized by local œdematous swellings, more or less limited in extent, and of transient duration. Severe colic is frequently associated with each attack. There is often a marked hereditary disposition; in one instance the disease was traced through five generations in one family. Its pathology is quite unknown, though Quincke and most observers consider it to be a vasomotor neurosis.

Edgeworth claims that his cases do not exactly conform to the descriptions of angio-neurotic or Quincke's œdema. He thinks that hysteria was an important etiological factor in the cases he reports. In the matter of treatment, arsenic in large doses is worthy of trial, and in one of Edgeworth's cases appeared to cure an affection which had lasted eleven years.

Phlegmasia Alba Dolens in Pneumonia.—J. M. DA COSTA (*Philadelphia Medical Journal*, September 10, 1898) has called attention to this rare complication of pneumonia. He has had three cases under observation, and has collected six from the literature. Of the nine, five were on the left side, two on the right, and two, Dr. Da Costa's recent cases, were bilateral. The prognosis is favorable, though the recovery may be tedious. John T. Metcalfe many years ago reported a fatal case. The usual seat of the lesion is in the internal saphenous or in the femoral vein, or in both.

Glycosuria and Gallstone-Colic.—ZINN (*Cent. f. innere Medicin*, September 24, 1898) refers to the fact that glycosuria has frequently been found by some clinicians in cases of cholelithiasis, whereas other observers have never found it. Exner examined the urines of forty cases of cholelithiasis in the surgical clinic at Heidelberg and found sugar present in every case but one. From this experience he considered the presence of sugar in the urine in doubtful cases of cholelithiasis of some diagnostic importance. All the cases were operated on, and the sugar always disappeared three to four weeks afterward. Zinn's results, from the examination of the urine in eighty-nine cases of cholelithiasis in Gerhardt's clinic in Berlin, showed glycosuria in only two instances. In both the presence of the sugar was only transitory.

Although Ord, Kraus, and Loeb have seen glycosuria follow gallstone-colic, Naunyn failed to find a single instance in 250 cases. He did observe glycosuria, however, in a few cases of gallstone associated with cirrhosis of the liver. From these statistics it would seem that glycosuria is very uncommonly associated with gallstones.

PÆDIATRICS.

UNDER THE CHARGE OF

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AND

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Value of the Sign of Kernig in the Diagnosis of Meningitis.—NETTER (*Société Médicale des Hôpitaux*, July 22, 1898) calls attention to this phenomenon, which was first remarked in 1882 by Kernig, of St. Petersburg, and was subsequently confirmed by Henoch, Bull, Blümm, and Friis. It is elicited in the following way: The patient is placed in dorsal decubitus, care being taken that the legs are relaxed and fully extended at the knee. When the child is raised to the sitting posture it is found that the knees are more or less flexed, and, despite all efforts, cannot be completely extended on account of contracture of the posterior muscles of the thighs. In some cases the angle made by the thigh and the leg is a right angle, and in no case has it been found to be greater than 135° or 140°. Complete extension becomes possible when the patient is put upon the back again. According to Netter's observation in forty-six cases of meningitis of whatever nature, this sign was wanting in but five cases, or about 10 per cent. It has not been observed in other conditions, having been found absent in numerous cases of typhoid fever, pneumonia, acute articular rheumatism, chorea, central affections in infants, erythema nodosum, and similar diseases. Netter believes that the presence of this sign confirms the diagnosis of meningitis when the symptoms are obscure, and suggests a latent meningitis when it is the only symptom present.

Two cases are quoted. One was a clear case of typhoid fever, but Kernig's sign was present. The patient died of a perforation, and the autopsy revealed the presence of a meningitis due to the staphylococcus aureus, together with the intestinal lesions of typhoid fever.

A second patient presented Kernig's sign, with slight symptoms of meningitis. Lumbar puncture was made, but withdrew no fluid. After a remission of ten days fever reappeared, and a fluctuating mass was discovered over the sacrum. This was incised, and the pus was found to contain the meningococcus. The infection had spread from the spinal canal, following the track made by the needle. The presence of meningitis was thereby established.

All varieties of meningitis are said to produce this sign, including tuberculous meningitis, secondary forms, and cerebro-spinal meningitis.

The Symptom of Bolognini in Measles.—A. Kœppen (*Centralblatt f. innere Medicin*, 1898, No. 26, S. 673) refers to a symptom described some years ago by Bolognini as existing in measles. This consisted in a peculiar sensation of friction, felt when gently rubbing the tips of the fingers over the surface of the abdomen with gradually increasing force. This phenomenon, which, according to Bolognini, could be felt from the prodromal period well on to the end of the disease, was considered to be due to a morbillous eruption upon the peritoneum, and he considered that it offered a diagnostic sign of measles.

Recently Kœppen had opportunity to control these observations in the course of an epidemic of the disease, during which he specially examined 316 children, several of them on more than one occasion. The symptom of Bolognini was observed in only 154 of these patients. Moreover, the author has been able to convince himself that the phenomenon consists not in a sensation of friction (frottement), but rather in a fine crepitation which recalls that given by subcutaneous emphysema, and seems to be due to the presence of bubbles of gas in the intestines. Indeed, most of the children in whom Kœppen found this symptom were suffering from diarrhœa with foamy stools.

Finally, the author has observed the existence of this symptom, though to a less marked degree than in measles, with children suffering from digestive troubles and who were free from measles. With healthy subjects he has never observed the phenomenon.

It follows from these later observations that the symptom observed by Bolognini, while very frequent in measles, cannot be considered as a pathognomonic sign of this affection.

A Peculiar Form of Post-Morbillous Pneumonia in Children.—Ivan Honl (*Revue Mensuelle des Maladies de l'Enfance*, August, 1898, p. 386) presents an interesting pathological study of a form of pulmonary inflammation which he has found quite frequently after death following some time after an attack of measles—a condition which he thinks has been too commonly ascribed to tuberculosis. This supposed frequency of tuberculosis after measles has been attributed by some observers to a predisposition to tuberculous infection produced by a diminished resistance created by the morbillous disease; or, as Birch-Hirschfeld has suggested, latent tuberculous lesions existing before the attack of measles has taken on an increased activity because of the mobilization of tubercle bacilli under the influence of the eruptive disease.

The careful observations of the author have failed to confirm this generally accepted opinion. In several instances, indeed, tuberculous lesions were found, principally of the lymphatic ganglia, but in not one of the cases did he observe an extension of the process to the lungs or to other organs, even in children who succumbed long after their attack of measles. In nearly all the cases terminating fatally he found pneumonia, either alone or accompanied by lesions of other organs (diphtheria, noma, enteritis).

The following forms were encountered:

1. *Broncho-pneumonia* of the ordinary type encountered in infectious diseases, which does not depend upon the etiologic agent of the primary disease.
2. *Croupous pneumonia,* which is an accidental complication in the course of the disease.
3. *Hemorrhagic pneumonia.*
4. *Pneumonia ending in suppuration* of the lung.
5. *True caseous pneumonia,* with constant presence of tubercle bacilli.
6. *Pneumonia with giant-cell formation,* but without tubercle bacilli.

The first five forms are well known and present no feature of special interest. The sixth form differs from the others, both to the naked eye and in its microscopical appearances. It resembles caseous pneumonia, clinically, in its chronic course, and anatomically, in the appearance of the parts invaded by the process. Anatomically, two forms of this phenomenon may be distinguished. In one are found granular foci resembling tuberculous nodules; the second form, observed when the disease has developed during a comparatively long period, resembles caseous pneumonia or a focus of atelectasis. Often, beside the pneumonia and the reactionary lesions of the pleura, there are bronchiectases and emphysema, always bronchitis and enteritis.

The histologic lesions of this form of pneumonia resemble either those of a muco-purulent inflammation or those of muco-proliferative inflammation. Its principal characteristic is the existence, in the midst of the foci, of the giant-cells of Langhans. The bacteriology of this form of pneumonia is not constant. In the foci the author has found pneumococci, streptococci, staphylococci, and the bacillus pyocyaneus, either isolated or in association; in the cases complicated by diphtheria, bacilli identical with the bacilli of Loeffler were present. The fact, however, is insisted upon that in none of the cases were tubercle bacilli found, either by microscopic examination or by animal inoculation. Moreover, when sputum of rubeolous patients suffering from capillary bronchitis or pneumonia was injected into the veins of rabbits, pulmonary lesions were produced which resembled caseous pneumonia, but in which no tubercle bacilli could be found. These lesions appeared only when the animal did not succumb to pneumococcic septicæmia; and when animals were used which had been more or less immunized against the pneumococcus no specific microbes were found in these foci of experimental pneumonia. After discussing the hypotheses which could be advanced to explain this form of pneumonia, the author gives the following as the most probable: When such patients die early the autopsy reveals an ordinary pulmonary inflammation; or, if they survive the pulmonary infection, the organism becomes slowly immunized against the pneumonic toxins, and recovery may take place. But as the organism has been enfeebled by the morbillous poison, the absorption of the exudate is imperfect, because of the emphysema and the turgescence of the lung. The exudate and the bacteria whose toxins have immunized the organism are not eliminated, remain in the affected parts, and react upon the tissues as foreign bodies, giving place to the formation of giant-cells and provoking a proliferative inflammation.

This hypothesis explains the subacute or chronic course of this form of pneumonia and the rapid emaciation of the patient—two facts which have largely contributed to the confusion of this peculiar form of post-morbillous pneumonia with true caseous pneumonia.

The Effects of Bathing upon the New-born Infant.—CZERWENKA (*Wiener klinische Wochenschrift*, 1898, No. 11) has studied a series of 400 new-born infants, half of whom were bathed regularly after birth; the other half were not bathed. He found that bathing did not materially interfere with the desiccation of the cord, since the latter fell during the first seven days in 80 per cent. of those bathed and 94 per cent. of those not bathed. The danger of infection of the umbilical wound is not great, since it was observed only once in the two hundred cases. As to increase of weight, independently of the conditions of alimentation, the average has been found to be slightly greater among the infants who were bathed than among those who were not. The author concludes that regular bathing should be practised from the time of birth.

A Fatal Case of Poisoning by Bromoform.—MULLER (*Münchener medicinische Wochenschrift*, 1898, No. 38) reports a fatal termination from accidental poisoning by this drug in a child of two years. During the absence of the mother, the child had gained possession of the bottle containing about six grammes of bromoform and had emptied it. A few minutes later he exhibited symptoms of drunkenness. Emesis was provoked, but he soon fell into a profound slumber interrupted by general convulsions, which were accompanied by arrest of respiration and cyanosis of the face. The physician, who arrived two and a half hours later, found the child scarcely breathing, the eyes closed, the face pale and bluish, the pulse running, the hands cold, the pupils contracted, and the muscles relaxed. When removed from the bed another convulsion occurred. The stomach was washed out with great difficulty, the contentss melling strongly of bromoform. Removal of the tube was followed by convulsion, with cessation of respiration and arrest of the heart. Artificial respiration proved unsuccessful.

At the autopsy the stomach and duodenum were greatly congested and contained bromoform, chemical analysis yielding more than a gramme of the drug. Traces were found in the blood and in the viscera. The principal lesions were a liquid state of the blood, which was dark red in color, and a marked congestion of the viscera, particularly of the brain and its membranes. Death appeared to be due to asphyxia.

Noma Pudendi due to the Loeffler Bacillus.—FREYMUTH and PERTUSCHKY (*Deutsche medicinische Wochenschrift*, 1898, No. 14) report a case of gangrene of the vulva, perineum, and thighs in a child of three years, occurring three days after admission to hospital with the classical symptoms of measles. Bacteriological cultures of the affected area showed the presence of diphtheria bacilli, and an injection of antitoxin was accordingly made and repeated on the following day. Twenty-four hours later the reparative process began and continued without interruption. Six days after the second injection membrane appeared on the tonsils, but yielded readily to one injection of serum and disappeared after forty-eight hours. Recovery followed.

Tuberculous Peritonitis Apparently Cured by the X-rays.—AUSSET and BEDART (*Annales de Médecine et Chirurgie Infantiles*, December, 1898, p. 870) report the case of a child suffering from tuberculous peritonitis, with effusion, that was apparently cured after several exposures to the Röntgen rays. Previous to this treatment three punctures and a laparotomy had been made without distinct result, the effusion reproducing itself more and more rapidly. The patient was then subjected to the rays from a Crookes' tube about once a week. After the third exposure an exploratory puncture showed that the effusion was hemorrhagic, instead of a clear, yellowish color. Two and a half months later there was marked gain in weight, and the abdomen, while still a little large, was quite supple.

Broncho-pneumonia.—SAMUEL WEST (*British Medical Journal*, 1898, No. 1952) concludes a thoughtful paper upon this subject with the following propositions:

1. That the primary and secondary broncho-pneumonias have a different bacteriological origin.
2. That secondary broncho-pneumonia is for the most part due to streptococcus infection derived from some source in connection with the air-tubes, throat, and mouth.
3. That primary broncho-pneumonia is of pneumococcal origin.
4. That pneumococcus inflammation occurs with almost equal frequency in the child and the adult.
5. That pneumococcal inflammation takes a different form in each—in the adult producing massive consolidation, and in the child disseminated patches of consolidation; in other words, that there are no real pathogenic distinctions between lobar pneumonia of the adult and primary lobular pneumonia of the child.

The author is therefore convinced that the term "broncho-pneumonia" would be best reserved for those inflammations of the lungs which follow antecedent affections of the bronchi, and that their exciting cause, for the most part, will be found to be other organisms than the pneumococcus; while, on the other hand, the primary broncho-pneumonia of children is really croupous pneumonia occurring in a disseminated and patchy form instead of a massive consolidation.

A New Clinical Sign in Scarlatina.—MEYER (*Presse Médicale*, 1898, p. 119) describes a clinical phenomenon in scarlatina which has never before been mentioned, probably because the disease has been ordinarily studied among children. In the most characteristic instances this sign consists in a paresis of the extremities, the patient complaining that he cannot move the hands or feet. This degree of disturbance, however, is very exceptional. Most frequently there is only a numbness of the hands, with sensations of tingling or formication. Numbness may be absent, and then the patient experiences pricking sensations localized in the extremities of the fingers or in the palm of the hands. Disturbances in the feet are of rarer occurrence; they may be noticed alone or in conjunction with those described in the hands.

This sign appears during the period of eruption, exceptionally before it.

Its duration is very variable; it may be experienced for only a few minutes, and not be felt again. In the majority of cases it is more durable, appearing several hours or a day after the beginning of the eruption and persisting for two or three days, ordinarily with interruptions. It may even be delayed in its appearance until the third, fourth, or fifth day of the eruption. It is accompanied by no painful sensation. Some patients experience this disturbance only when they wish to use the hands; others at the moment of leaving the cold bath or when the hands are dipped into water.

This sign is very constant; the author has observed it in seventy-nine out of one hundred cases among adults in the Hôpital de la Porte d'Aubervilliers. Among several children it was observed once, in a boy of seven years.

In obscure cases this sign may be of value in diagnosis. It may also serve to determine a retrospective diagnosis in patients who have presented no eruption and in those whose desquamation is fugacious or delayed.

The author has not encountered this sign in other eruptive diseases; it is absent in the eruptions of la grippe, in simple or diphtheritic anginas, in toxic or drug erythemata, notably in mercurial erythema, the diagnosis of which is often quite difficult.

SURGERY.

UNDER THE CHARGE OF

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The Treatment of Pyloric Stenosis.—TUFFIER (*La Presse Méd.*, February 9, 1898), in discussing the treatment of pyloric stenosis, lays special stress upon the employment of gastro-intestinal anastomosis for all varieties of this condition, no matter what their cause.

He does not consider that the only indication for operation is where the patient's life is so endangered that nothing else will avail; the operation should not be too long delayed, no matter what the cause. The diagnosis is sometimes difficult, but it should be made as soon as possible. Incoercible vomiting, progressively increasing pain and enfeeblement that are rebellious to all medical measures are sufficient indications for operation. Dilatation of the stomach he does not consider an indication unless it is accompanied by marked stenosis and the accompanying symptoms.

As operative measures he relegates divulsion, or Loreta's method, to the treatment of cases of spasm. Stenosis by adhesions and bands pure and simple is of rare occurrence, and is generally accompanied by other conditions that require a gastro-intestinal anastomosis to relieve them completely.

Pyloroplastic operations, except in cases that are not very marked in character, require anastomosis to be done, either at the time or later by a second operation, to make them efficient. Gastro-enterostomy is the most frequently indicated operation; it creates a deviation in the course of the contents of the stomach from the old way and reduces irritation at the pylorus.

The author prefers to make the anastomosis in the posterior wall of the stomach at the most dependent point, and also prefers the use of a simple suture in two rows, employing an ordinary sewing-needle; he makes an opening that will admit his index-finger. This operation he can complete in thirty minutes, and he believes it is more certain and secure than plates or mechanical contrivances.

The removal of the pylorus he believes should be applied only to cases of malignant nature, but the simple entero-anastomosis in inoperable cancer cases is a much better surgical procedure than the formation of an artificial anus in cases of cancer of the intestines.

His operations have been very successful in their effects upon the patients, and he has seen the new orifice so assume the function of the pylorus that when the stomach was inflated with air none of it escaped into the intestine.

Pylorectomy.—In a paper in which he reports two successful pyloroplasties, MORISON (*The British Medical Journal*, February 19, 1898) points out the fact that the blood-supply of the small intestines is derived from the mesentery by small, straight transverse vessels, the anastomosis is fair near the mesentery, but very poor and sometimes entirely wanting on the convex surface of the intestine, hence sloughing is more likely to occur at this point. This should be remembered in planning all operations, and the blood-supply should be interfered with as little as possible.

In the pyloroplastic operation which he has employed he made a longitudinal incision in the anterior wall of the duodenum about one inch in length. In this way its edge was made more nearly equivalent to that of the pyloric end of the stomach, and the coaptation of the two was rendered more easy, while the blood-supply was not interfered with.

The coaptation is facilitated by the introduction of four temporary sutures. A continuous catgut suture is introduced through the entire thickness of both the wall of the intestine and that of the stomach, including all the coats. This secures a water-tight joint. Peritoneal adhesion is secured by a second row of interrupted sutures which include the peritoneal and muscular coats only.

Traumatic Affections of the Liver.—In discussing the treatment of traumatic injuries of the liver, WARING (*British Medical Journal*, March 19, 1898) gives the following as the clinical conditions which he considers may form indications for the performance of a surgical operation for the removal of a portion of that organ.

1. Carcinoma of the gall-bladder, in which the disease has not extended beyond the gall-bladder and the adjacent portion of the liver and there are no signs of secondary growths either in other parts of the liver or in other viscera.

2. The presence of a localized non-malignant tumor of the liver, such as

angioma, angiofibroma, fibroma, or adenoma, which is increasing in size and is giving rise to trouble.

3. The presence of a localized hepatic tumor which is due to a mass of echinococcus multilocularis.

4. Congenital hernia of a portion of the liver in which the herniated portion cannot be returned within the abdomen.

5. Sarcoma, primary in the liver, occasionally occurs, and has been treated by excision. In one case the patient was alive two years afterward, and in the other the disease recurred in a few weeks and the patient died.

Primary carcinoma of the liver is exceedingly rare. If it is in the form of a localized tumor, an attempt may be made to remove it. The liver is frequently the seat of secondary malignant growths, but operation is contraindicated in such cases.

The author states that his original researches on animals and the study of the results produced in reported cases have led him to the following conclusions:

1. That the dangers of hemorrhage after removal of portions of the liver have been much exaggerated.

2. That the best method of controlling and arresting hemorrhage from liver tissue after it has been incised or torn is temporary compression of the vessels in the gastro-hepatic omentum, and then ligature of the divided vessels.

3. That when the liver is the seat of growths such as are classed as operable, a surgeon ought to be prepared to carry out an operation for their removal.

4. That the mortality which will result from operations of this kind is not greater than in many of the recognized abdominal operations, such as resection of the intestine.

The Employment of Rubber Gloves in Aseptic Operations.—FRIEDRICH (*Centralblatt für Chir.*, 1898, No. 17), in replying to queries and criticisms on his advocacy of these gloves in operations, says that he does not advocate their employment in all cases, but when an operator or an assistant has a wound on his hands that is not fully healed, the employment of rubber glove-fingers is not sufficient; in such case the whole hand should be covered. The employment of gloves in all operations would greatly retard the operator and destroy the fineness of his tactile perception, while complicating the aseptic technique. Friedrich has gloves wrapped up in a bandage and sterilized for one hour in a steam sterilizer. This bandage is cut with antiseptic instruments at the time of operation. The gloves are half filled with sterile water to facilitate the process of putting on; they are handled externally only with sterilized cloths or bandages. Greater tactile acuteness is secured by stretching the finger of the glove tightly over the finger. Sharp instruments and spicules of bone are the greatest dangers in their path.

The Operations for Goitre.—In discussing the operations performed in the Berne Clinic, WORMSER (*Rev. de Chir.*, April, 1898) summarizes Kocher's views regarding the indications for the different methods of operating, as follows:

I. Thyroidectomy is indicated:

1. For malignant tumors of the thyroid gland.
2. For acute or chronic struma.
3. For parenchymatous goitres (diffuse hypertrophies of the gland).
4. For polycystic goitres.
5. For multinodular goitres.

It is contraindicated, on the other hand, if there is no normal thyroid tissue present.

II. Strumectomy (intraglandular enucleation) is indicated:

1. In unilocular cystic goitres.
2. In isolated nodules situated in normal tissue, if they can be removed rapidly and without marked hemorrhage; but otherwise a thyroidectomy is indicated.
3. For large nodules situated in immobile goitres.

In reference to exophthalmic goitres, Kocher prefers ligature of three of the arteries at one time, and later of the fourth. Section of the sympathetics is, as yet, too new to warrant an opinion.

The Treatment of Pott's Disease.—After an historical discussion of the treatments that have been employed in this disease, GEVAERT (*Ann. de la Soc. Belge*, July 15, 1898) makes the following summary of the work which has been accomplished by the new method of forcible straightening as advised by Calot:

1. It is undoubtedly true that this method has dangers, some of which are: Death during the chloroform anæsthesia, epileptic tremors and contractions of the extensor muscles of the feet during the manœuvres, hæmatemesis during narcosis, rupture of an abscess with discharge into the pleura, and death; consecutive paralyses of the lower extremities and bladder; rapid generalization of tuberculosis; and operative shock, with chronic convulsions and death. Fourteen deaths have already been reported as the direct result of the operation.

2. Lesions are frequent, especially in the region of the gibbosity, and principally when the spinous processes have not been resected. The majority of surgeons now place their bandages in such a way as to leave an orifice at this point, thus avoiding pressure and ulceration.

3. Chloroform is not absolutely essential to the operation, and is always a danger.

4. Bandages that include the head, neck, and shoulders have many inconveniences. Ulcers on the head and shoulders may result, and the confinement of the patient is very uncomfortable, etc. In addition, it is often useless if a bandage is employed which covers the shoulders and supports the head. The Sayre apparatus is frequently used, reaching up to just below the shoulders and leaving the patient in the supine position.

5. Reduction is made easy by various forms of mechanical apparatus which exert traction and pressure. They are all based on the principle of extension. They facilitate especially the placing of bandages without a large number of assistants.

6. The diagnosis of the possibility of reduction can be made only by attempting it, thus determining whether anchylosis is present or not. The

majority of surgeons are of one accord in saying that great force should not be employed in making the reduction, and that anchylosis should not be broken when already established.

7. Persistent paralysis of the lower extremities is an indication for immediate reduction.

8. It seems preferable to wait for the healing of abscesses before commencing the treatment of the gibbosity.

9. Radiographs furnish valuable information relative to perivertebral ossifluent abscesses and regarding later ossification.

10. Regarding the influence of the location on treatment, the consensus of opinion shows that reduction and immobilization at one operation are only applicable to lesions situated in the dorsal region, chiefly in the median portion. In the sub-occipital and cervical, and frequently in the superior dorsal region, extension by apparatus is generally preferred. In the lumbar a Sayre's corset placed in position during the extension frequently suffices to correct the deformity.

11. With regard to age, it is sufficient to say that the lesion of Pott's disease is not generally most serious in adult patients, and that extension apparatus is badly supported by adults.

12. The majority of authors repudiate, at the present time, radical operative interventions: ablations, cuneiform resections, laminectomies, etc., as, also, palliative operations, such as resections of the apophyseal spines, ligatures of the spinous processes, etc.

13. Anatomical and pathological considerations prove to a certainty that the loss of osseous substance resulting from the separation of the vertebræ can never be filled by osseous tissues. This fact leads to the following general conclusions:

14. Recent cases of Pott's disease and those in which the gibbosity comprises only a few vertebræ are the only ones that can be treated by this method.

15. Pott's disease is cured in two ways: 1, by anchylosis of the vertebræ; and, 2, by a pseudo-anchylosis or synostosis of the posterior arches, the lateral spines and the posterior spinous processes. The latter method is the more frequent, and is the one which occurs after forcible correction. It is therefore absolutely essential to respect the posterior arches and not to weaken them by osseous resections or ligamentous excisions.

16. In very cachectic children redressement should not be attempted, nor should it in those who cough, in those who have abscesses or fistulæ, nor in those cases presenting evidences of degeneration of any of the internal organs.

17. Opinions differ regarding the necessity of keeping the patients in the dorsal decubitus, some authors preferring to allow them to wear apparatus and walk about.

Chronic Osteomyelitis of the Lower Extremity of the Femur.—MARCHANT (*Rev. d'Orthopêdie*, May, 1898) reports an interesting and instructive case in which the patient has suffered from repeated attacks of tubercular arthritis of the knee. Rest in bed had, in the earlier attacks, always led to complete functional recovery. Later, it had been necessary to tap the joint, and finally, when the patient came under the writer's care, an osteomyelitis of the lower extremity of the femur demanded operative interference. The bone was trephined and pus and necrosed bone removed. The patient made a complete recovery, but some time later, while under massage, felt a sharp pain that extended into the joint. This was in April; in December he was again admitted to the hospital, where it was discovered by the aid of the Röntgen ray that a fracture had taken place at the seat of the former operation. It was surprising that this fracture should have given so little annoyance, and that a pseudarthrosis should have persisted, without consolidating, for so many months. An operation would have been the treatment adopted by many surgeons, but fifty-five days of complete immobilization sufficed to produce firm bony union, as demonstrated by a skiagraph. It is a case that demonstrates the value of conservative surgery in appropriate instances.

The Immediate Correction of the Deformities Resulting from Pott's Disease.—GOLDTHWAIT (*Boston Medical and Surgical Journal*, July 28, 1898) gives the following as the conclusions which he has derived from his experience with this method:

It has been clearly shown that similar operations have been performed at different periods in previous centuries.

The operation, as simplified by the writer, has been performed in a number of cases, upon which the paper is based. An apparatus is described by which it is possible to accomplish the correction without the necessity of a large number of assistants, and which makes it possible to apply the plaster-of-Paris jacket with marked hyperextension of the spine. No unpleasant results have been experienced, and in five cases in which paralysis was present the recovery was almost immediate.

In cases which begin acutely the operation seems to promise a moderate diminution of the existing deformity, and with the method of after-treatment as advised it is probable that the course of the disease will be shortened and that the usual increase of the deformity will be avoided.

In cases in which there is marked deformity the operation is justifiable at times, in order to secure better respiratory and digestive action, as well as to improve the position of the spine. In these cases considerable relapse is to be expected, owing to the extensive destruction of the bones and the imperfect osseous repair which takes place in tubercular disease.

The Treatment of Vicious Positions of the Femur after Coxalgia.—PHOCAS (*Rev. d'Orthopédie*, September, 1898) summarizes his views on this subject as follows:

1. In spite of all the other therapeutic measures proposed for the bad positions following coxalgia, linear subtrochanteric osteotomy should be considered the operation of choice.
2. In certain particular circumstances mechanical correction or arthrectomies are procedures that may be advantageously employed.
3. Rarely other forms of osteotomy may be employed.
4. Subtrochanteric osteotomy may, in certain cases, be employed with advantage in the treatment of coxalgia in the course of its development.

5. Bilateral subtrochanteric osteotomy may be advantageously employed in cases of bilateral anchylosis of the hips, especially if the limbs are fixed in a crossed position.

The Curative Power of Antivenomous Serum.—CALMETTE (*British Medical Journal*, May 14, 1898), in referring to a criticism of the antivenomous serum which he has discovered and prepared, says that it antagonizes the action of all venomous poisons, and that the reason certain others have not secured results equally as good as his is that they have not taken into full account the difference in weight between the animals experimented upon, and have therefore not used the serum in doses proportionate to the weights and resisting power of the animals employed.

The author also maintains in the most emphatic manner, and in spite of adverse criticism, that the serum of an animal hypervaccinated against a very active venom can, when injected in a sufficient quantity, prevent the death of an animal inoculated with fatal doses of venom of other serpents.

The Cure of Extrophy of the Bladder by Cysto-colostomy.—TUFFIER (*Gaz. Hebdom. de Méd. et de Chir.*, July 14, 1898) gives the following details of an operation which he has performed successfully, with relief of this troublesome condition:

1. The entire mucous surface of the bladder is dissected free, with the exception of the vesical trigone and a small margin of mucous membrane. Special care must be taken in the upper portion, where the peritoneum is closely associated. Rigid sounds are passed into the ureters, which facilitates their dissection for some distance upward. The entire field of operation is then carefully protected by aseptic cloths.

2. The peritoneal cavity is then opened as low down as possible, the sigmoid flexure is drawn out with as little traction as possible, forming a hernia through the peritoneal opening, which is closed about it. The intestine is then opened by a longitudinal incision as if for an artificial anus.

3. The vesical trigone is then sutured to the borders of this opening, thus adding a portion of the bladder to the intestinal wall. Mucous membrane is sutured to mucous membrane and the muscular coat of the bladder to the sero-muscular coat of the intestine. Either silk or catgut may be employed.

4. The cutaneous and aponeurotic layers are then sutured together.

For a few days a fistula may persist from which fecal matter and urine are passed; it, however, will close spontaneously.

Four months after the operation the abdomen is completely healed, with a deep depression where the bladder had been. The urine passes entirely by the intestine. There is no abdominal pain, no sign of intestinal inflammation, and no pruritus ani. The patient has five or six stools a day without any inconvenience. The general health is good, and there is no indication of renal involvement. The condition resulting from the operation is therefore much to be preferred to that obtained by any other operative procedure.

Prostatectomy by Combined Suprapubic and Perineal Methods.—WATSON (*Boston Medical and Surgical Journal*, May 5, 1898) describes an operation in which both lateral lobes of an hypertrophied prostate were removed through a suprapubic incision; this was made through the median line in the ordinary manner, after the skin and subcutaneous adipose tissue, which was present in a large amount, had been laid back by a crescentic incision extending from one anterior superior spinous process to the other, with its convexity downward and its middle point just above the upper margin of the symphysis pubis. An external perineal urethrotomy was performed to provide for subsequent drainage and also to bring the prostatic lobes better within reach from within the bladder by pushing them up from below by the finger-tip inserted in the perineal wound. After an incision through the mucous membrane and fibrous capsule a large fibroid growth was easily enucleated from each lobe. The suprapubic wound was drained by two tubes, after the bladder had been sewed tightly about them and the angles of the incision partially closed. The carbol packing in the bladder was attached to a suture and removed through the perineal incision. The patient was discharged, healed, at the end of the sixth week. The general health and local condition remained excellent at the time of the report.

The case is a striking example of the benefits that, in a certain number of instances, follow the operation of suprapubic prostatectomy, and which may be hoped for in a very fair proportion of cases when, as in the present instance, the surgeon has the opportunity of performing it upon a patient whose age and general condition are such as to lessen the risk of a fatal result of the operation (which must always remain a serious one) and whose bladder has not yet lost its expulsive power, or at any rate the capability of regaining it when the obstacle to the outflow of urine has been removed.

THERAPEUTICS.

UNDER THE CHARGE OF

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The Pharmacological Action of the Thyroid Gland.—Dr. Robert Hutchison states that the effect of the administration of this substance is to increase oxidation in the body. The products of the disintegration of the nitrogenous tissues appear in the urine almost entirely in the form of urea; uric acid and the xanthin-bases being neither regularly nor appreciably increased, while the products of the fat destruction are eliminated as carbon dioxide by the lungs and water by the kidneys, the last being largely increased. It is probable that the increased elimination of nitrogen is due to destruction of the circulating proteids, and that the fixed proteid tissues are attacked only when the store of fat has been considerably diminished. The practical inference is that in treating patients suffering from obesity the diet should not be much restricted, and especially that nitrogenous matter should be abundantly represented in it. Whether the remedy acts directly upon the tissues or only through the medium of the nervous system, its essential nature would seem to consist in a hastening on of the life-history of the cells. Increased rapidity of the action of the heart is, perhaps, the most constant of the effects observed from thyroid administration; often there is noted also irregularity, palpitation, or even threatened failure. Therefore, caution is necessary if the patient is debilitated, and especially in cases of obesity if the fatty change has affected the heart. The active part of the thyroid has no effect upon blood-pressure. The fall which occurs when decoctions of the gland are used is due to the action of organic extractives. In the blood it produces a physiological leucocytosis and diminishes hæmoglobin; the latter effect may be counteracted by simultaneous administration of iron. Later observations show that the effect on the red blood-corpuscles is only brought about by large doses. The active principle (iodothyrin) appears to be excreted entirely by the kidneys, and this excretion continues for several days after the administration of it has ceased. Whatever preparation is employed it is best to give it in small doses and frequently, rather than in large quantities at longer intervals.—*British Medical Journal*, 1898, No. 1959, p. 142.

The Use of Xeroform in Dermatology.—DR. EHRMANN reports the results of the use of this remedy [tribromophenol bismuth] upon 210 patients. Externally it was employed for balanitis, moist eczemas, traumatic genital erosions, eczema of the anus and buttocks, and for that caused by iodoform. Various suppurating and gangrenous processes were treated: venereal ulcers, ulcers of the leg, tuberculous ulcers of the nose and penis, phlegmons of the hand, suppurating buboes, and incised furuncles. It was also employed for septic operations. In the last it was used to cover the closed incision, and as a gauze, held in place by retaining bandages. For suppurating wounds it was efficient in checking discharge and promoting early growth of skin. The frequent use of the remedy is not advantageous, for a too strong crust prevents discharge. The remedy was of especial value in surface diseases characterized by excessive secretion, of which balanitis is an instance. Then the remedy was superior to salicylic dusting powder in that it is not caustic, quickly destroys the odor, and finally permits regeneration of normal epidermis. Internally administered, it has proved of benefit in anal eczema, this symptom being so frequently associated with habitual constipation, intestinal atony, and marked flatulence, an intestinal antiseptic is required. Thirteen instances have come under observation of both external and internal use of this remedy. The constipation was relieved in all save two, and in these the flatulence was lessened. The chronic urticarias as well as other dermatoses of autotoxic origin are benefited by the use of this intestinal disinfectant. Of twenty-five patients treated, twenty-three were cured.—*Wiener medicinische Blätter*, 1898, No. 22, S. 343.

When Should Mercurial Treatment be Commenced in Syphilis?—DR. NEUMANN believes that the preventive treatment of syphilis by mercury may be briefly disposed of as valueless so far as the destruction of the virus is concerned, for we know as yet of no drug that will produce constitutional immunity, though mercury will doubtless inhibit and modify syphilitic infection for a season. The cardinal object in our symptomatic therapeusis is to subdue or avert the morbid phenomena. From this it follows that the period of administration of a drug such as mercury should be such that the constitutional effects of the disease may be most powerfully combated at the very outset. As to how long mercurial treatment is to be continued, the answer is made that it should cover a definite period after the recession of all visible signs of the disease, and this is the most practical means of preventing a recurrence of the disease. The author has found that the disease is not only less liable to recur, but the tertiary symptoms, as well as the chronic intermitting conditions, are greatly modified, while superfluous saturation with the drug is avoided. Mercury should not be administered before the appearance of constitutional symptoms, for these are not prevented, nor, indeed, is the disease as a whole mitigated. A further objection to this preventive form of treatment lies in the loss of efficacy which is entailed by the early use of the specific potency of mercurial administration. In fact, there is no drug yet known which will act as a preventive of constitutional syphilis, nor avert the manifestation of symptoms at variable periods, although there are a few exceptions to this general assertion. Further, mercury and the iodides are specific antisyphilitic remedies that modify syphilitic products, but do not destroy the virus.—*Medical Press and Circular*, 1898, No. 3087, p. 1.

Casein Ointment in Dermatology.—M. RABY states that this is: Casein, 14; alkalies, 0.43; glycerin, 7; vaseline, 21; antiseptic, 1; water, a sufficient quantity to 56-57. It is in appearance a white cream, of sufficient consistency, absolutely neutral, and spread over the skin forms, in a few minutes, a flexible and resistant varnish, which is removed simply by washing. Its principal advantage lies in its containing a considerable amount of vaseline, and with it can be incorporated a number of drugs. The alkalies, salts of alkaline reaction, and ammonium sulpho-ichthyolate thicken the ointment, and then it is necessary to add water or diminish the proportion of casein. Acids can be added only in small amount, because they coagulate the casein; but, nevertheless, 1 per cent. of salicylic acid can be incorporated. The hydroxyl derivatives of benzol, as resorcin and pyrogallol, liquefy the casein ointment, but they do not prevent the formation of a varnish upon the skin. The following combinations can be made: 1. Pyrogallol, 10 per cent. 2. Resorcin, 2; zinc oxide, 10 per cent. 3. Precipitated sulphur, 5; zinc oxide, 10; water, 10 per cent. 4. Ammonium sulpho-ichthyolate, 10; resorcin, 1; water, 10 per cent. 5. Tar, 10; water, 10 per cent. 6. Coal-tar, 10 per cent. The casein of commerce seems to be satisfactory. Pure casein is ten times more expensive, but does not give a sensibly better product.—*Nouveaux Remèdes*, 1898, No. 22, p. 505.

Treatment of Fissures of the Nipple with Orthoform.—DRS. CH. MAYGRIER and R. BLONDEL have made use of three methods: 1. Moist dressing. The powdered drug is applied directly to the fissure, and over this are placed compresses of sterilized gauze dipped in sterilized water or boric acid solution and expressed, the whole covered with waterproof tissue. After nursing the dressing is replaced. 2. Dry dressing. This is simply the substitution of dry, sterilized gauze. 3. Alcoholic dressing. This consists of the application of a few drops of a saturated solution of this drug in 80° alcohol to the fissure and the use of a dry compress. Of these the last is preferable, although all have given good results.—*Revue de Thérapeutique Médico-chirurgicale*, 1898, No. 23, p. 797.

Ozæna Treated by Antidiphtheritic Serum.—DR. FERNAND CATHELIN considers that this disease is produced by the bacillus of Loewenberg. In the instance reported the injections were continued for seven months, with an interval of one month, the total amount used being sixty-three drachms. Local treatment, as douches containing antiseptic substances, must not be neglected. The success obtained warrants further trial of this method.—*L'Echo Médical du Nord*, 1898, No. 46, p. 361.

Marmorek's Serum for Facial Erysipelas.—DR. J. L. ANDRÉ reports five instances of its use. In all these instances the results were satisfactory. Complete and final decline of temperature to normal was observed save after one injection. This fall is rapid, and not by lysis. The remaining of the temperature at a low level proves either that the influence of the serum extends over several days or that the effect of a single dose develops a change in the system which persists a certain time. If this small number of observations shows anything it is that the injections should be repeated at forty-eight hour intervals. That the erysipelas may continue its evolution while the temperature remains normal was demonstrated in one instance, when, although the temperature fell, the cutaneous signs—redness and swelling—persisted for several days, but becoming less day by day. In general, however, all signs disappeared as the temperature fell. The injections are usually harmless; local pain is rare; the urine is unchanged in quantity and quality, and albumin does not appear. The serum employed varied in age from two to fourteen months. The older is less active; that of eight months always gave positive results, not immediate, it is true, but rapid and certain.—*Archives de Médecine et de Pharmacie Militaires*, 1898, No. 11, p. 340.

Injections of Calomel in Lupus Vulgaris.—DR. BERNTHEIM reports a single instance. This patient had been unsuccessfully treated for several years by caustics, scarification, curetting, and tuberculin. At eight-day intervals injections of twelve minims of 10 per cent. emulsion of calomel in olive oil were made. After eight injections distinct decrease in the hyperæmia was observed. A few weeks later all ulcerations were healed, the skin became thin, pale, and normal, and cure was reached in three and one-half months.—*Münchener medicinische Wochenschrift*, 1898, No. 46, S. 1468.

Treatment of Gonorrhœal Arthritis.—DR. LOEWENHARDT administers equal quantities of salol and sandal-wood oil in gelatin capsules, thrice daily, five to ten grains at a dose. The urethral disease must be treated. The joints must be kept at rest, but plaster-of-Paris dressings are to be avoided. The most effective applications are those characterized by a high degree of heat—sand-bags, or natural hot-spring baths, or a hot-air apparatus maintaining a temperature of 212° to 302° F. without disturbing the patient.

The retrogression of the disease is marked and due to the sensitiveness of the gonococci to heat. Apparatus adapted to each affected joint can be made cheaply, so that recourse to commercial machines is entirely unnecessary.—*Münchener medicinische Wochenschrift*, 1898, No. 45, S. 1449.

Infiltration Anæsthesia.—DR. PAUL HEINZE found that distilled water is absolutely useless as a local anæsthetic on account of the preliminary irritation of the sensory nerves that it occasions from the swelling of the cells by imbibition. Salt-solutions less strong than 0.6 per cent. cause imbibition by the cells and swelling; those of 2.5 per cent. and upward cause dehydration. Sodium chloride in 0.2 per cent. solution is very painful to inject, and the anæsthesia therefrom is not complete. Sugar solutions have no specific effect upon the sensory nerves, and potassium bromide is an intense irritant, while methyl-violet and blue are still more unsuitable. Caffeine and its salts belong to the class of painful anæsthetics, and their depressant action on the sensibility of the cutaneous nerves was found to be very slight. Carbolic acid is efficacious so far as its local action is concerned, but there is danger of gangrene. Cocaine in 0.02 per cent. solution is very painful, and a tender, red infiltration is left behind. Morphine causes some anæsthesia, and all solutions are accompanied by more or less violent paræsthesias. A 0.1 per cent. solution acts precisely as distillled water. It is active as a local anæsthetic only in the stronger solutions, and always causes intense local irritation. The solutions known as Schleich's are efficacious only on account of the cocaine which they contain. Acetanilid and antipyrin solutions are painful and useless, and guaiacol is equally inapplicable. Eucaine in watery solution causes uncomfortable sensations that may amount to pain, and it cannot replace cocaine. As for beta-eucaine, its solutions are of equal value with the same percentages of cocaine, because the osmotic tensions of the two drugs are about the same. The irritant effect of the former is even less. It is less toxic, not decomposed on boiling, and therefore can be sterilized. Orthoform is readily decomposed by even careless warming, and is hardly practicable for the purpose. Beta-eucaine is the remedy of choice, because it is less irritant, while being the equal of cocaine in anæsthetic effects. The following solution, warmed to body-temperature when used, is stable and can be sterilized by boiling: Beta-eucaine, 1; sodium chloride, 8; distilled water, 1000.—*Archiv für pathologische Anatomie, Physiologie und klinische Medicin*, 1898, Heft 3, S. 466.

Intravenous Injections of Normal Saline Solution.—DR. HORACE TRACY HANKS makes use of intravenous injections of normal saline solution for loss of blood from any cause, from severe traumatism, and for the early stage of sepsis after an operation, and for the suppression of urine and obstruction of the bowels from paralysis. A practical method is a common-sized teaspoonful of table-salt in a pint of pure water, the whole to be boiled for one-half hour, and filtered through several thicknesses of a sterilized towel and kept in closed bottles, well corked with cotton, and this cotton properly protected with a bit of clean gauze. A two-quart bottle should be filled with this solution and kept at a temperature of 115° to 118° F. by a towel wrapped about it, upon which hot water is poured as frequently as is necessary to maintain this temperature. With the rubber tubing, glass connections, stop-cock, and a probe-pointed aspirating needle of suitable size, the apparatus is complete. Its simplicity warrants the more frequent employment of this method.—*American Gynecological and Obstetrical Journal*, 1898, vol. xiii. p. 233.

The Action of Formol Upon the Thyroid Gland.—M. Lépinois suggests this substance in 1 per cent. aqueous solution for the preservation of thyroid glands intended for therapeutic purposes. He concludes: 1. This solution keeps them fresh and renders them unchangeable even if they are in the form of pulp. In the latter case a small quantity of glycerin should be added and the divided masses covered with a thin layer of gelatin, to prevent complete desiccation. 2. This treatment does not notably modify the chemical composition of the thyroid gland so far as the iodine-containing albuminoids are concerned, and their solubility in pure or salt water is hardly diminished. 3. Digestion of the gland is unaffected, and this and the preceding observation lead to the belief that their therapeutic activity is preserved.—*Bulletin Gênéral de Thèrapeutique*, 1898, t. cxxxvi. p. 655.

The Treatment of Diabetic Coma.—Dr. Albert Robin, remarking upon the clinical forms (cardiac, dyspnœic, and nervous), formulates the following. 1. Stop all anti-diabetic *régime* and put the patient upon a milk diet. Avoid ill-considered medication, be doubly watchful at the first onset of slight intercurrent diseases. 2. Increase elimination by the bowels of poisons retained in the organism—for example, by an ounce of sodium sulphate. 3. To saturate the acids of the organism each day, give five drachms of sodium bicarbonate. 4. Watch the heart; if the pulse is small, rapid, or irregular, administer infusions of digitalis and ergotin to contract the peripheral arteries. If the pulse is slow, soft, and very compressible, give subcutaneous injections of citrated caffeine and by the mouth theobromine in forty-five grain doses. 5. To relieve the digestive disturbances and to increase the tolerance for milk administer before each portion of milk a small amount of strychnine sulphate, and after it a powder composed of five grains of pepsin and two of maltine [diastase]. To prevent lactic-acid fermentation without interfering with digestion, one-fourth of a grain of ammonium fluoride, well diluted, is recommended. 6. Two injections each day of a 25 per cent. solution of sodium glycero-phosphate are advised. 7. Energetic friction should be practised over the whole body with a stimulating liniment. 8. Large quantities of oxygen should be inhaled. If this treatment is commenced at the moment premonitory symptoms of coma appear, it frequently will ward it off. In the presence of actual coma treatment is unavailing.—*Bulletin Gênéral de Thèrapeutique*, 1898, t. cxxxvi. p. 353.

The Treatment of Neuralgias.—Dr. Hamm recommends the spraying of ether upon the painful areas of neuralgia and headache. In some instances the spray has been so long continued that a pellicle of ice formed upon the skin, but no untoward results followed. In frontal headache, when seven grains of antipyrine had failed, one application relieved the pain.

Relapses are not frequent. This method is recommended as simple, cheap, and practical.—*Therapeutische Monatshefte*, 1898, Heft 10, S. 549.

The Use of Asaprol in the Treatment of Typhoid Fever.—M. Clemente Ferreira thinks that the intestinal lesions are the result of the action of the toxin circulating in the system invaded by the germ of Eberth, which elaborates a virulent poison which causes the material alterations and morbid phenomena which go to make up the picture of this disease. It follows, then, that the leading purpose of the use of topical disinfectants, the insoluble antiseptics—*i. e.*, direct action upon the germs in the intestine—lacks scientific foundation. The soluble antiseptics should therefore receive consideration. For this reason the use of calomel in small doses, which are thus converted into soluble mercurial compounds, acts more efficiently than an insoluble salt. Six patients have been under observation treated by this remedy, which is calcium-naphtol or monosulphonate, and all shared its beneficial effects as regards temperature, general conditions, and the course of the disease. Thirty to forty-five grains were given each day either in solution or cachets in two-hourly doses. If diarrhœa persists, bismuth subnitrate or chalk is added. Besides the results of clinical observation, the agglutinating action which this agent exercises upon cultures of the bacillus has been demonstrated, and furnishes a cogent reason for its exhibition.—*Bulletin Général de Thérapeutique*, 1898, t. cxxxvi. p. 581.

Bismuth-chinolin Rhodonate.—Dr. L. Forchheimer recommends this substance $(C_9H_7N.HSCN)_2\,Bi\,(SCN)_3$, which is a large-grained powder of a reddish-yellow color, insoluble in water, alcohol, or ether. When this is placed upon an ulcer, if the secretion is abundant, a paste is formed; if this is scanty, a very adherent crust is produced, under which the ulcer generally heals. Rather infrequent dressings (four to six days) are preferable. Before redressing a local bath should be administered to facilitate the removal of the crusts. Sometimes, particularly in women, the powder causes pain, of which the reason is not apparent. In ulcers of the leg, whether varicose or syphilitic, in venereal ulcers, and acuminate condylomata the healing is prompt and certain, owing to the antiseptic and drying properties of this substance.—*Therapeutische Monatshefte*, 1898, Heft 8, S. 445.

Endermol.—Dr. Max Walters reports upon this substance, especially in the treatment of scabies. This is nicotine salicylate $(C_{10}H_{14}N_2\text{-}C_7H_6O_3)$, and occurs as colorless, transparent crystals easily soluble in water and most organic solvents, and has a slight burning taste. It may be employed as a 0.1 to 1 per cent. lanolin ointment, 5 per cent. in oil and traumaticin, or a 0.1 per cent. in sapo viridis. Of sixty-seven patients treated by preliminary baths and soap inunction sixty-four were cured and the itching disappeared after one application. The remaining three required six treatments. In three instances relapses occurred from sleeping in unclean beds. Absolute security followed from four applications, although fewer were effective. In young subjects some symptoms of nicotine-intoxication followed: headache, nausea, vomiting, palpitation, and dyspnœa.—*Therapeutische Monatshefte*, 1898, Heft 8, S. 443.

The Treatment of Cystitis.—Dr. T. Gordon Kelly had failed to find a perfectly reliable urinary antiseptic until he had employed hexamethylen tetramin, also known as urotropin. He reports three instances of its use, the last being the most striking. A gentleman, aged thirty-five years, had suffered from chronic cystitis, complicated by attacks of hæmaturia, of fifteen years' standing. Malignant disease and villous growths in the bladder, as causes of the hemorrhage, had been excluded. The opinion was finally reached that this resulted from a congestive cystitis set up by the great excess of mucus in the urine, which contained pus and was alkaline. Twenty grains of this remedy were administered twice daily, and upon the ninth day the urine became clear and upon the fourteenth free from pus for the first time in fifteen years. For a month fifteen grains were taken twice daily, then one-half this amount was given for four months, during which time no pus nor blood appeared in the urine.—*The Therapist*, 1898, No. 10, p. 130.

The Results of Serum Treatment.—Mr. W. E. Green, after adducing statistics showing the value of this treatment in diphtheria, particularly when adopted early, has collected 36 cases of tetanus treated by antitoxic serum, of which 25 recovered; 40 of puerperal fever and allied conditions, with 33 recoveries; and 11 of pneumonia with 9 recoveries. As regards prophylaxis, Semple relates that out of 84 persons vaccinated against typhoid fever during an epidemic not one contracted the disease; while of 120 unvaccinated under the same conditions, 16 were attacked by it. Inoculation with Haffkine's plague serum was practised in 5251 cases with a mortality of 1.75 per cent., while of 14,830 treated in other ways 20.6 per cent. died. The use of antivenomous serum promises equally good results, but those in tuberculosis so far are unsatisfactory. The last successes are those obtained by Sanarelli in the serum treatment of yellow fever.—*British Medical Journal*, 1898, No. 1960, p. 224.

GYNECOLOGY.

UNDER THE CHARGE OF

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Uterine Cough and Other Reflex Neuroses.—Schaefer (*Centralblatt f. Gynäkologie*, 1898, No. 31), at the conclusion of an article on this subject, summarizes as follows: In women who are predisposed, especially at the time of menstruation and during pregnancy, irritation of the mucous membrane of the upper third of the vagina may provoke the so-called uterine cough. Inflammatory conditions in the broad and sacro-uterine ligaments may give rise to similar reflex phenomena; fermentative processes and auto-intoxication doubtless predispose to these. In the same patients irritation of the vulva and lower third of the vagina is accompanied by purely local reflexes.

Uterine cough is due to irritation of the sensory filaments of the inferior hypogastric plexus with its utero-vaginal plexus (supplying the vault of the vagina and portio), and the spermatic plexuses and hemorrhoidal nerves with their ganglia within the folds of the broad ligaments, provided that there exists already a pulmonary neurosis or predisposition. Irritation of the pudendal nerve, on the contrary, causes no distant reflex phenomena.

Reflex disturbances may be: (*a*) Physiological reflexes in distant motor and vasomotor regions; (*b*) impulses transmitted along nerves the resistance of which has been weakened by morbid changes; (*c*) irregular impulses due to a general nervous depression.

Tubercular subjects, or those with marked gastric symptoms, are especially liable to reflex cough.

In cases of uterine displacement in neurotic individuals these reflex disturbances are often promptly relieved by the use of pessaries, although general treatment is also important.

Histological Changes in the Vagina.—PRETTI (*Zeitsc hrift f. Geb. u. Gyn.* Band xxxviii. Heft 2), from studies of the minute anatomy of the vagina in thirty-two specimens, arrives at the following conclusions: Contrary to the statements of many writers, neither glands nor mucous follicles could be demonstrated in the lining membrane. The latter is not a true mucous membrane, but is a true inversion (Einstülpung) of the epidermis. The squamous epithelium becomes more and more flattened with advancing age, gradually diminishing in thickness from the vestibule toward the portio. The height of the papillæ does not depend upon the age of the subject, as the papillæ may be slightly marked in young women.

Extensive round-cell infiltration was frequently noted in the vagina when macroscopically it appeared to be perfectly normal. This is not to be regarded as necessarily pathological, but may be due to the irritation resulting from an acrid cervical discharge.

The Relations of Disease of the Adnexa to Retroflexion.—JAYLE and LIMA (*Remèdes Gynécol. et de Chir. Abdom.*, 1897, Nos. 11 and 12) discuss at length the question whether the symptoms accompanying uterine displacements are due directly to these or to coexisting disease of the adnexa. Out of 1100 cases of disease of the tubes and ovaries they selected 76 as suitable for careful study. Their conclusions are thus stated: 1. So-called latent retro-displacements, which give rise to no symptoms, were not observed in a single instance. 2. Painful retro-displacement is nearly always complicated with disease of the adnexa. 3. Mobility of the displaced uterus is not an indication that the tubes and ovaries are healthy. 4. Affections of the adnexa are usually more severe in connection with retroflexion than with retroversion. 5. The prognosis and treatment of uterine displacements bear an intimate relation to the extent of the accompanying tubal and ovarian trouble. 6. The extent of the lesions in the adnexa, together with the patient's nervous condition, are the principal factors to be considered in treating uterine displacements. 7. Simple reposition of the uterus, without further treatment directed to disease of the organ itself and of the ovaries and tubes, does not insure a cure. 8. Retro-displacement may cease to give rise to marked symptoms if the attending complications have been relieved.

9. Conservative (non-surgical) treatment of uterine and periuterine inflammation is greatly hampered by the existence of a displacement.

Pathogenesis of Osteomalacia.—MACEDONIO (*Arch. di Ost. e. Gin.*, 1897, No. 10) reviews the various theories of the etiology of this affection and adopts Fehling's—*i. e.*, that osteomalacia is to be regarded as a trophoneurosis of the osseous system, due to reflex irritation from excessive or pathological activity of the ovaries. Since, as Consentino has recently demonstrated, ovulation continues during pregnancy and lactation, it is easy to explain why the disease progresses so rapidly after conception occurs.

Castration offers a certain cure. The improvement in the general condition of the patient and the prevention of conception, in consequence of the operation, do not sufficiently account for the beneficial result.

FERRONI (*Ibid.*) compares the microscopical appearances noted in sections of ovaries removed from two osteomalacic patients with the minute changes present in the ovaries of rhachitic subjects. In the former, which were enlarged, the germinal epithelium was quite normal, the follicles not increased in number, and the corpora lutea normal. Small foci of hyaline degeneration were found in the cortex. The bloodvessels of the stroma were notably enlarged, the media and adventitia being much thickened, and their nuclei degenerated. Elsewhere the vessels were greatly dilated. Hyaline degeneration of their walls and also of the stromal connective tissue was often observed.

In the ovaries from rhachitics the cortex was normal, but in the stroma there were essentially the same changes as in the former specimens.

Glandular Elements in Uterine Fibromyomata.—LOCKSTAEDT (*Monatsschrift f. Geb. u. Gyn.*, Band vii. Heft 2) describes seven specimens of fibromyoma in which he found follicles or cysts lined with epithelium. The tumors were nearly all subserous and were attached in the neighborhood of the Fallopian tube, so that it seems to him more plausible to infer that the epithelial elements were derived from the glands in the tubal mucosa, rather than from remains of the Wolffian body, as inferred by Von Recklinghausen. He also opposes Orlof's view that the tumor may grow around and include epithelial pouches.

LEGNEN (*Ann. de Gynécologie; Centralblatt f. Gyn.*, 1898, No. 34) calls attention to the fact that epithelial cells are sometimes found between the muscular fibres and in the meshes of the connective tissue in fibromyomata, especially in those which are adjacent to the endometrium. These cells usually appear as single irregular layers, lining blind follicles. He believes that they are derived by proliferation of the glands of the uterine mucosa. Their presence explains the occurrence in these tumors of cysts with epithelial contents, and may throw some light upon the much-vexed question of the carcinomatous degenerations of fibromyomata.

Diseases of the Adnexa Following Vaginal Hysterectomy.—VAN DER HOEVEN (*Nederl. Tijdschr. v. Verlosk. en Gynæcol., Centralblatt f. Gyn.*, 1898, No. 35) discusses the question of the fate of the tubes and ovaries, or their remains, after removal of the uterus. He does not agree with Brennecke that the ovaries undergo atrophy, the view being disproved by numerous observations both at the examining-table and during secondary cœliotomies. Existing disease of the adnexa may subsequently be cured, may remain stationary, or may progress, the first being the rule. On the other hand, pathological changes may take place in adnexa which were normal at the time of the operation, necessitating further interference. Cystic degeneration is most common, the writer having observed four cases of ovarian and parovarian cysts, and hydrosalpinx. Seven others are mentioned by different authors.

Massage in the Treatment of Post-operative Ileus.—HABERLIN (*Centralblatt für Gynäkologie*, 1898, No. 42) reports cases of intestinal obstruction after cœliotomy treated successfully by massage after the usual means had failed. He recommends abdominal massage, with change of the patient's position, soon after operation, in order to encourage peristalsis and to prevent intestinal adhesions. In case such adhesions occur, with evidences of obstruction, he believes that massage should always be tried in preference to reopening the wound. The fear of causing hemorrhage is unfounded, and there is no risk in tearing recent adhesions of injuring the gut. The only exception is in the case of adhesions which serve to wall off purulent foci. The pain attending the manipulations is not severe; even if increased it does not serve as a contraindication.

A loop of intestine adherent in Douglas's pouch or to a stump can be freed in this way; laxatives and enemata are to be employed at the same time, except in cases in which too active peristalsis is undesirable (as in incarcerated hernia). If a secondary cœliotomy becomes necessary the patient's chances of recovery are not jeopardized by the massage.

Tubal Menstruation.—THOMSON (*Centralblatt für Gynäkologie*, 1898, No. 45) reports two cases which serve to throw some light upon this disputed question, others having been published by Hofmeier, Terrillon, and Landsbery. In the first a fistula communicating with the tube discharged blood at every menstrual period, the hemorrhage beginning and ceasing with the commencement and cessation of the uterine flow. In the second case an abdominal fistula followed an operation for early tubal pregnancy. Eight months later the patient observed bleeding from the fistulous opening coincident with menstruation. This phenomenon was repeated several times until a silk ligature was discharged, when the fistula closed.

These clinical facts seem to confirm the observations of Martin and Leopold that during menstruation the mucous membrane of the tubes undergoes a change similar to that of the endometrium, though in a less degree. The same relative change in the tubes is noted during pregnancy and the puerperium.

Abdominal Hysterectomy with Clamps.—WOLFRAM (*Centralblatt für Gynäkologie*, 1898, No. 45) reports a desperate case of supravaginal amputation for the removal of a fibroid weighing thirty-five pounds, in which the patient was so weak and anæmic that it was necessary to operate as rapidly as possible. No ligatures were used, seven large and ten small clamps being attached to the broad ligaments, stump, and bleeding vessels. In closing the abdominal wound the posterior peritoneal flap was brought up and sutured above the handles of the clamps, so as to shut off the stump from the general cavity. Iodoform gauze was then packed around the stump and forceps. The patient was under light anæsthesia only a little more than half an hour, and made a good recovery, the clamps being removed on the eighth (!) day, while the gauze was not entirely removed until eight days later. The course of the case was similar to that of one in which the stump had been treated by the extraperitoneal method, except that the usual necrosis of the tissues did not occur, since the stump itself was not strangulated. The patient left her bed at the end of three weeks.

Accessory Kidneys in the Broad Ligaments.—ROSSA (*Archiv für Gynäkologie*, Band lvi. Heft 2) describes two cases in which he discovered accessory renal tissue beneath the free border of the broad ligament in new-born infants. Further investigation led to the discovery of similar inclusions in adult subjects.

Microscopically these nodules appeared as groups of round or polygonal cells with large nuclei, without any interstitial tissue. In the centres of these non-vascular bodies were secondary cavities. The cell-groups had no capsule, and were in close relation to the endothelium of the peritoneum. They showed no evidences of any inflammatory process, and were doubtless the source of certain broad ligament cysts.

Sensibility of the Female Genitals from a Medico-legal Stand-point—CALMANN (*Archiv für Gynäkologie*, Band lv. Heft 2) cites a case in which the plaintiff accused a midwife of producing an abortion by inserting an instrument into her uterus. The defendant asserted that she had merely catheterized the bladder and afterward tamponed the vagina. It was decided that it was impossible for the plaintiff to tell simply from the subjective symptoms whether the catheter had entered the uterus or the bladder.

Calmann conducted a series of experiments upon eighteen women for the purpose of testing this point. It was found that the majority could not distinguish by their sensations alone whether the urethra or some part of the vagina was touched with an instrument, nor could they form any opinion as to their size or shape. Except when the bladder was full they were unable to tell when the urine was being drawn. They could not distinguish when a sound entered the cervical canal, especially in the case of pregnant women. Disinfectants, such as carbolic acid and bichloride of mercury, rendered the vaginal mucous membrane less sensitive.

Placental Polypi in the Fallopian Tubes.—FRÄNKEL (*Archiv für Gynäkologie*, Band lv. Heft 3) reports two cases of persistent metrorrhagia following tubal abortion. The affected tubes were removed, and in the middle third of each was found a typical placental polypus, identical in structure with those seen in the uterus under similar conditions. At the base of the polypus the wall of the tube was thin, the muscular fibres being absent. In one ovary was a corpus luteum cyst with a lining of flattened epithelium. Fränkel believes that these polypi are often present after rupture of a gravid tube, or tubal abortion, and, as in the case of similar growths in the uterus, do not tend to become absorbed. The possibility of this condition should be borne in mind if fresh attacks of external or internal hemorrhages occur after recovery from a tubal abortion.

Intestinal Fistulæ Resulting from Clamps.—SCHILLER (*Zeitschrift für Geb. und Gynäkologie*, Band xxxviii. Heft 1), commenting on several cases of entero-vaginal fistulæ following hysterectomy with clamps, emphasizes the importance of not only guarding the intestine from injury during the application of the forceps, but also of carefully covering their ends with gauze after they are *in situ.*

Diabetes from a Gynecological Stand-point.—KLEINWACHTER (*Zeitschrift für Geb. und Gynäkologie*, Band xxxviii. Heft 2) has collected twenty-two cases bearing on this subject, 64 per cent. being women who had passed the menopause. Menstruation was diminished and irregular in four cases. There was no evidence of premature atrophy of the genital organs in any instance.

Pruritus of the vulva was present in 73 per cent., but there was no relation between the intensity of the irritation and the amount of sugar in the urine. In short, there seemed to be no change in the internal genitals referable to the diabetic condition.

OBSTETRICS.

UNDER THE CHARGE OF

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A Case of Labor Complicated by Contracted Pelvis, Double Uterus, and Septic Infection.—In the *Monatsschrift für Geburtshülfe und Gynäkologie*, 1898, Band viii. Heft 4, SCHÜTTE reports the case of a primipara who was admitted to his hospital in labor and who was found to have a flattened and obliquely contracted pelvis. It was impossible to tell whether the head would succeed in engaging, and accordingly the patient was given morphine to secure sleep. The fœtus was in breech presentation, its heart-sounds being plainly heard.

On the following day it was evident that the mother could not deliver herself, as she had rapid pulse and considerable fever. Accordingly, the child was removed by Cæsarean section, the uterus closed and replaced in the pelvis. The patient died shortly afterward from exhaustion.

On autopsy it was found that a double uterus and vagina existed in the case, together with the contracted pelvis. The patient had evidently been infected by the midwife, who first examined her some time before her admission to the hospital. Although the child made several efforts to breathe, it could not be revived.

The Differential Diagnosis between Phlebitis and Lymphangitis of the Pelvic Organs, and the Prognosis and Treatment of Each.—In the *Zeitschrift für Geburtshülfe und Gynäkologie*, 1898, Band xxxix. Heft 3, THOMAS contributes a paper upon this subject, and reports a number of cases from Freund's clinic at Strassburg.

He draws attention to the anatomy of the pelvic lymphatics, and distinguishes three groups of lymphatic ganglia—one near the rectum, one near the ureter and spermatic artery, and one between the two. Should infection attack the lymphatics it will proceed in an ascending series through these ganglia.

The anatomy of the veins of the pelvis is clearly known, and attention has often been called to the readiness with which they are entered.

In diagnosticating between phlebitis and lymphangitis in cases of puerperal septic infection, the active onset, rapid course, and severe symptoms of phlebitis must be contrasted with the gradual progress of lymphangitis. In the latter weeks or even months may be consumed in a slowly moving infection which may cause exudate extending to the utmost limits of the broad ligaments and adjacent peritoneum. There may be little or no vaginal discharge, and if the patient's strength be maintained recovery is the rule.

In phlebitis, however, the patient has high fever and chills. There is a purulent vaginal discharge, the inflamed veins can sometimes be distinguished, and the result is often fatal.

As regards treatment in phlebitis, the extirpation of the infected focus is indicated if it can possibly be done. The writer described a case in which the abdomen was opened and the spermatic vein of one side dissected out, going down to the ureter. The operation failed, however, to save the patient's life. The uterus should be thoroughly curetted as early as possible, but should be disturbed as little as possible.

In lymphangitis a thorough cleansing of the womb should be made as soon as the case is seen, and in the gentlest possible manner. After this the treatment should be limited to stimulation, local applications of heat or cold to the lower abdomen, sitz-baths, and douches. In one of Thomas's cases an abscess formed near Poupart's ligament, but this was readily evacuated by incision.

Phlebitis is one of the most fatal forms of puerperal septic infection, while lymphangitis is the common form of sepsis, and when the latter occurs in patients in good condition a recovery may usually be expected.

The Etiology and Treatment of Osteomalacia.—SCHNELL (*Zeitschrift für Geburtshülfe und Gynäkologie*, Band xxxix. Heft 3) contributes an article upon this subject based upon cases observed in the clinic at Würzburg.

He divides the cases into the chronic and acute forms. He finds that the earlier in the life of the patient the disease occurs the more progressive is its character. The first pains in this disease are often felt in the pelvis.

In fourteen of these cases the ovaries were subjected to careful examination.

They were found atrophic, the bloodvessels enlarged, and hyaline with connective-tissue degeneration, and later hyaline degeneration in the cortex and about the follicles. The greatest changes in the ovaries were found in the severest cases of osteomalacia. The connection between the two conditions seems clearly shown.

As regards treatment, the removal of the ovaries was invariably followed by improvement. In some cases as soon as three days after operation the pains became less. Ten patients were treated with cod-liver oil and phosphorus, and improvement not especially marked was observed in these cases. General hygienic measures in the form of baths, tonics, and massage were in a sense useful, but not efficient. There is good reason to believe that the effect of removal of the ovaries is permanent in arresting the disease.

The Development of the Placenta.—KOSSMANN (*Zeitschrift für Geburtshülfe und Gynäkologie,* Band xxxix. Heft 3) presented to the Obstetrical Society of Berlin a demonstration of the development of the placenta. The following conclusions were drawn:

Immediately after the impregnated ovum enters the uterus a marked growth and development occur in the crypts of the endometrium. The syncytium replaces the nuclei of the endometrium, forming large vacuolated spaces as the epithelium is removed. The ectoblast of the ovum joins the syncytium. It is not attached to the connective tissue, but is covered with syncytium lying free of the crypts of the endometrium. The villi develop rapidly from the ectoblast, penetrating the lining membrane of the womb. The villi can scarcely be said to grow into the glands of the uterus, but penetrate partly into these organs. As soon as the allantois and the chorion develop the villi begin to develop in excess of the ectoblast. The maternal layer of the ectoblast is covered over with syncytium. The maternal blood passes in capillaries in the spaces between the villi and around the glands of the uterus, the decidual cells undergoing degeneration.

Automatic Beating of the Embryonal Heart Three Hours After Death.—A most interesting example of this extraordinary occurrence is reported by NEUGEBAUR (*Centralblatt für Gynäkologie,* 1898, No. 47). The case was one of ectopic gestation at about the fourteenth week. The embryo was living, and operation was undertaken to save the mother from the risks following rupture of the gestation sac. When the abdomen was opened it was impossible to separate the entire sac and to deliver the placenta. Accordingly the operator incised the fœtal sac and endeavored to extract the embryo. Upon grasping the head it separated from the body, and the spinal cord was drawn out of its canal with the head and brain. The embryo was removed little by little.

On opening the thorax the heart was seen beating in reflex peristalsis. No especial effort was made to place the heart under favorable conditions, but this extraordinary phenomenon was observed by the staff of the clinic for three hours. The sac of the embryo was packed with gauze, and the mother ultimately made a good recovery.

Experimental studies by physiologists have demonstrated the possibility of such an occurrence. It is rare, however, that the heart of the human embryo comes under observation. Pflüger was astounded to observe beating of the heart in a human embryo twenty days old. This continued for an hour.

Treatment of the Stump of the Umbilical Cord.—In the *Centralblatt für Gynäkologie,* 1898, No. 47, BUDBERG describes his method as employed in the clinic at Dorpat. He has employed the method in two hundred cases, and finds it the best which he has yet tried.

It consists in wrapping the stump of the cord in cotton soaked with alcohol. When it is possible to obtain it, pure alcohol should be employed. A thin layer of cotton is placed over the whole. The advantages claimed for this method are the fact that the cord dries absolutely in an aseptic condition, that suppuration does not occur, and that the cord promptly separates.

Rupture of the Spleen During Pregnancy; Extirpation; Recovery.—SAVOR (*Centralblatt für Gynäkologie,* 1898, No. 48) reports from Chrobak's clinic in Vienna the following interesting case:

The patient was a multipara, thirty-one years old. She was about six months pregnant when she was kicked violently in the left side of the upper abdomen by a drunken man. This was followed by pain and shock, the patient being immediately brought to the clinic. On examination no fracture of the ribs was present, nor was the area of dulness over the spleen increased. A positive diagnosis could not be made.

On the following morning there were marked tenderness and tympanites in the left inguinal region. The patient complained of severe pain in the left side of the abdomen. These symptoms steadily increased, with rapidly developing anæmia. Accordingly in the afternoon the abdomen was opened and blood was found in the peritoneum; the uterus was uninjured, but the spleen was ruptured deeply into its substance.

The incision was accordingly enlarged and the spleen removed. The patient reacted well, but was threatened with abortion, which was controlled and prevented by the use of opium. She made a good recovery, went to full term, and was afterward delivered of a fully developed child in spontaneous labor.

On examination, upon the anterior surface of the lower half of the spleen there was found a rupture which extended through the entire thickness of the organ. Bleeding had been partly controlled by a firm clot. Hemorrhage beneath the capsule had also taken place, and the pulp of the spleen was pale, and the capsule easily separated.

The Combined Trendelenburg-Walcher Posture in Obstetric Operating.—In the *American Journal of Obstetrics,* December, 1898, DICKINSON contributes an interesting and well-illustrated paper upon this subject. He has found that the combination of the Walcher and Trendelenburg postures is of the greatest advantage. In the absence of an operating-table, a chair without rungs between its back legs may be used for an inclined plane, and the patient may be prevented from slipping by means of a sheet passing over her shoulders, behind the neck, the ends tied to each rear leg of the chair. The buttocks project beyond the back of the seat, the patient's legs are spread wide and dropped backward, and free access to the birth-canal is procured. The posture is especially favorable for anæsthesia.

In maternity hospitals the usual Trendelenburg table may be employed with a portion cut out, permitting access to the vulva.

He calls attention to several incorrect methods of using the sheet sling. This should be passed broadly across the back and tied on the outer side of each leg just below the knee. In this way the limbs are rotated outward.

Precocious Maternity.—In the *Montpellier Médical*, 1898, No. 45, VALMALE reports the case of a girl, aged thirteen years and six months, who was delivered of a full-term child in the clinic. She first menstruated when twelve years and eight months old, and conception occurred a month afterward. The child occupied the second position, the vertex presenting. The forceps was applied at the superior strait, and the infant, a male, safely delivered. It weighed 3700 grammes. Its length was 53 cm. The placenta weighed 550 grammes. The patient made an uninterrupted recovery.

This case is reported as an example of precocious maternity, although it is not especially remarkable, as several cases are on record in which the mother was younger than this.

Temperature in Eclampsia.—GMEINER (*Prager medicinische Wochenschrift*, 1898, No. 48) concludes, from a series of papers upon this subject, that fever always accompanies eclampsia when the attacks follow one another rapidly. The type of fever is remittent, and the temperature goes in many cases to 104° F. and above. Prognosis depends not so much upon the height of the fever as upon its persistence and progressive ascent.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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The Vaccine Bodies.—ARMAND HÜCKEL (Die Vaccinekörperchen. Nach Untersuchungen an der geimpften Hornhaut des Kaninchens. Zweites Supplementheft der Beiträge zur pathologischen Anatomie und zur allgemeinen Pathologie, 1898). This work, on the bodies found in the epithelial cells of the rabbit's cornea after inoculation with vaccine virus, forms a monograph of 148 pages. It is beautifully illustrated with four double-page colored plates, containing 179 figures, and represents three years' work on the part of the author. The field of labor chosen is small but elaborately worked over, and the minutest details of every step of the work are given in full. The subject-matter is divided into three parts.

In the first part, which forms almost two-thirds of the monograph, the author reviews first the literature of his subject briefly, calling attention to the views of Guarnieri, Monti, Ruffer, L. Pfeiffer, and others who believe that the vaccine bodies are protozoa, and to that of Salmon, who claims they are derived from leucocytes. He then takes up his own experiments. With vaccine from four-day-old pustules on calves he inoculated the corneæ of seventy-six rabbits, thereby obtaining 130 preparations from which he prepared 24,000 sections. He studied the corneæ fresh and after fixation in Flemming's solution and in corrosive sublimate. The best stains were obtained with Biondi's triple stain after fixation in corrosive sublimate. Control experiments, such as burning or scratching the cornea, infecting with pus organisms, etc., proved negative in all of the twenty-two rabbits tried.

Experiments proved that rabbits were readily susceptible to vaccinia. Small pustules developed in four days after inoculation of the nostril, and healed in thirteen days; later inoculations on the same animal resulted negatively.

After inoculation of the cornea the conjunctival secretion increased up to the sixth day. If the primary injury was severe, ulcers were produced, but healed in a few days.

The inoculations were so arranged that the early lesions could be studied at intervals of six hours, the later lesions at intervals of twelve hours.

In the first six hours little could be noticed beyond the mechanical injury, the invasion of a few leucocytes, and the presence, as early as three hours after inoculation, of vaccine bodies.

In the next six hours the epithelium was swollen, leucocytes were numerous, and certain drop-like bodies from 1.5 to 5 μ in size appeared in the cells near the inoculation wound. Usually several were present in a cell, and they were surrounded by a clear zone.

In the next twelve hours the basal cells of the epithelium were much swollen and the vaccine bodies had steadily increased in number, especially in the upper layers of cells.

Study of the lesions at later periods showed the same peculiar affection of the epithelial cells spreading peripherally, where the same changes could be found that at first occurred in the centre around the inoculation wound. It was therefore possible to study the whole development of the lesion in one specimen in which the process was well advanced.

The author next treats in detail of the various bodies found in the cells. The colors given refer to those obtained with Biondi's triple stain.

The *naked bodies* have no envelope or border and are not surrounded by any granules or thread-like zone. They stain deeply with the ordinary nuclear stains, and are not easily decolorized. With Biondi's stain they are colored dark blue, as are the other bodies mentioned below. They are usually spherical in shape, have no definite structure, appear at first in depressions in the nucleus, later in the protoplasm, and vary greatly in number and size in a given cell.

A second form of body is surrounded by a homogeneous mantle which is of variable thickness and stains red.

A third form, which is the most abundant of all, is spherical, varies much in size, and is surrounded by red granules.

In a fourth form delicate, somewhat granular filaments extend outward from the central blue body and are inserted into the surrounding protoplasm of the cell.

Bodies also occur in the form of a half-moon, sickle, spindle, etc.; they are not infrequent, appear later than the spheroid forms, stain light to dark or purplish-blue, and are found close to the nucleus only. Usually they are not naked, but are surrounded by at least a few reddish granules.

Other forms than those mentioned are met with, but are rare. Careful study shows that all of these bodies undergo the same degenerative changes. They swell and stain more lightly, a progressive formation of vacuoles takes place within them, and they often become lobulated. The bodies in breaking down form granules and drops which stain red.

The cells containing these bodies may be well preserved when the bodies show marked degeneration, and *vice versa*. Sometimes the protoplasm of the cells shows a filamentous structure.

Fifteen corneæ were examined on a warm stage immediately after excision. The same bodies seen in hardened preparations could be made out. Careful examination of them failed to show any change of form or evidence of motion.

Of the micro-chemical reactions of these bodies the most interesting, perhaps, are that when treated with a saturated solution of common salt they disappear, while 5 per cent. acetic acid brings them out very sharply.

The second part of the work deals with the various hypotheses in regard to the nature of the vaccine bodies. Salmon believes that they are masses of chromatin derived from leucocytes which have gotten into the wound from the conjunctival sac. Others think they are derived from the nuclei of the epithelial cells or from extruded nucleoli. Many others, like Guarnieri and L. Pfeiffer, believe that these bodies are protozoa which are multiplying in the cells.

In the third part of his work Hückel advances the view that these various bodies are derived from the protoplasm of the epithelial cells, because while most of them lie in vacuoles in the protoplasm a few do not; these latter are usually sharply defined, but occasionally fade off into the surrounding protoplasm. On this account he believes that the bodies are derived directly from the cell protoplasm, and he finds additional proof for this view in the filaments which sometimes connect the bodies with the surrounding protoplasm.

He regards the various bodies as of equal importance; they arise in the same way, all lie generally close to the nucleus, react alike to reagents, and undergo the same degenerative changes. Various combinations of the different forms and transition stages between them are met with.

With various irritants it is possible to produce red but no blue bodies within the epithelial cells of the cornea. He therefore concludes that the blue bodies arise through the specific action of the vaccine poison, because they cannot be produced in any other way. He says that while his work is negative as to the nature of the vaccine virus, and throws no light on this question, it has cleared up the nature of the so-called vaccine bodies.

The Epidermoids and Dermoids of the Arachnoid of the Brain and Cord. — TRACHTENBERG (*Virchow's Archiv*, 154, ii. 274) reports a case of multiple cholesteatomata which certainly seems to be unique. A man, fifty-five years of age, suffered from progressive paralysis of his lower extremities for two or three years before his death. A clinical diagnosis of compression myelitis was made. The post-mortem examination showed a large number of firm, yellow granules and nodules of various sizes scattered along the posterior surface of the cord. At the lower end of the cord was a cystic tumor measuring 4 cm. long and 1 cm. thick, and filled with yellow, gruel-like material. Small nodules similar to those along the cord were found also at the base of the brain, over the left frontal lobe, and in the lateral ventricles; in the right they were especially numerous and large.

Examination of the tumor at the lower end of the cord showed its soft contents to be masses of fat. No epithelial lining to the cyst could be found. In the wall were fibrous tissue, smooth muscle-fibres, sebaceous and coil glands, fat-tissue, ganglion cells, and nerves. Some of the small cysts in the ventricles were lined with epithelium. The writer believes that some developmental disturbance must have occurred the whole length of the cord at the time of the closure of the neural canal; this view is strengthened by the fact that the tumors are all on the posterior surface of the cord. He concludes that his case strongly favors the views advanced by Bostroem in regard to cholesteatomata, namely, that those which contain no hairs are due to aberrant fœtal epidermic cells alone, while those that contain hairs are due to aberrant cells of the epidermis and cutis.

Bostreom believes that such a wandering in the central nervous system of fœtal epidermic cells, either alone or in combination with cells of the cutis, occurs quite frequently, but that the cells can develop only when they come in contact with the vascular pia or a plexus.

The New Formation of Elastic Fibres in the Intima.—JORES (*Ziegler's Beitr. z. path. Anat.*, 1898, xxiv. S. 458) publishes his interesting studies on the new formation of elastic tissue in endarteritis. He concludes that endarteritis is a compensatory process not only in the sense in which Thoma uses the term, but also with regard to the new formation of a functionally active elastic tissue for the vessel wall.

He produced, by ligating arteries in animals, a condition analogous to endarteritis in man. The ligated carotid arteries of rabbits killed twenty days after the operation showed a definite thickening of the intima. The intima appeared very cellular, and the cells were surrounded by a fine network of elastic tissue. This picture changed but little in the further course of the process. The elastic fibres developed early and not, as formerly held, in the late stages of endarteritis. The first formation was noted eight days after ligation. The elastic tissue appeared as extremely fine punctate lines in close relation to the protoplasm of the connective-tissue cells.

By Weigert's method he was able to demonstrate that the formation of elastic fibres occurs regularly in endarteritis thrombotica. In a vein of an amputation stump, six months after the operation, and often in phlebitis, he found numerous fine elastic fibres in the intima.

Jores does not hold the commonly accepted theory that the elastic tissue is formed from intercellular substance, but believes that it arises directly from the protoplasm of the connective-tissue cells. He bases his view upon the following: (*a*) The early appearance of the elastic tissue; (*b*) the close relation of the youngest fibres to the cells.

General Infection by the Diplococcus Intracellularis of Weichselbaum.—GWYN (*Phila. Med. Journ.*, vol. ii. No. 24) reports a case in which, during life, the diplococcus was demonstrated in the cerebro-spinal fluid obtained by lumbar puncture, also in thick, yellow, stringy pus obtained from the knee-joint, and finally in the circulating blood. At the autopsy the micro-organism could be demonstrated only in cultures from the lesions in the meninges.

[This is the first case in which this micro-organism has been found in the circulating blood, and one of the very few in which it has been found in the joints.]

The Bacteriology of the Simple Posterior Basic Meningitis of Infants.—STILL (*Journ. of Bact. and Path.*, vol. v. No. 2) states the results of bacteriological examinations in eight cases of the above disease. In one case (in the healing stage, one hundred and fourth day) cultures were sterile. In the other seven he found a flattened diplococcus (in pure culture in six cases) corresponding, except in a few minor differences, to the morphological and cultural characteristics of the diplococcus intracellularis found in epidemic cerebro-spinal meningitis. The differences which he found are a great vitality, a more abundant growth in broth, and a less certain virulence. These differences are so slight, however, that he believes they may be accounted for by a natural variation, and considers the organism found by him to be identical with the diplococcus intracellularis of Weichselbaum. The cases of simple basic meningitis of children are, therefore, to be regarded as sporadic cases of epidemic cerebro-spinal meningitis. Clinical observation as well as the gross anatomy and the results of bacteriological examinations favor this view.

In four of the cases there was a periarthritis. A bacteriological examination was made in one case, and the exudate was found to contain the same micro-organism as was found in the meningeal exudate.

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THE CLINICAL FEATURES OF SPORADIC TRICHINOSIS.

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OCCURRING in the form of an extensive outbreak following a *fest*, no disease is more readily recognized than trichinosis, as in the epidemics at Hadersleben and Emmersleben, in which several hundred persons were attacked. In the smaller, more common family outbreaks, as they may be termed, the diagnosis is rarely in doubt. The difficulty really arises in the sporadic cases, a very large proportion of which are overlooked. Clinically, in hospitals and in private practice, trichinosis is an exceedingly rare disease, and yet in post-mortem and anatomical work the number of subjects in which calcified trichinæ are found is by no means inconsiderable. My own experience in this matter illustrates this. When a student at the Toronto School of Medicine, in 1868, I found two subjects with calcified trichina cysts, from one of which I reared in rabbits the adult worms. I found them in six subjects in the post-mortem-room of the Montreal General Hospital. I saw them in two at the post-mortem room of the Philadelphia Hospital, and the other day Dr. F. A. Packard reminded me of a case in which we had found them in the dead-house at the hospital of the University of Pennsylvania. In all of these eleven cases the trichinæ were widely spread throughout the muscles, and during the invasion the subjects must have had a very serious illness. Dr. Flexner tells me that among the first 1000 autopsies in my colleague Welch's department of the Johns Hopkins Hospital there were three cases.

Until quite recently I have had no clinical experience with the disease, having seen (to recognize) but one case in Traube's clinic in Berlin, in 1873. The probability is, of course, that in a hospital service of more than twenty years I have frequently overlooked cases, just as might have been done in three or four of the cases here reported. Within the past two years and a half five cases have been in my wards —one in March, 1896; two admitted during 1897, and two during the present year, 1898. I propose to take up the clinical features presented by them, and to gather, if possible, some facts which may perhaps enable us in the future to recognize this disease more readily. As a preliminary I would like to give an abstract of the history of the first case in which it was recognized that in man the trichinæ produced a severe and fatal disease. Before 1860 the presence of the parasites in the muscles was regarded as an anatomical curiosity. The report is by Professor Zenker (*Virchow's Archiv*, Bd. xviii.), the well-known pathologist, at present in Erlangen, at that time in Dresden. A girl, aged twenty years, was admitted to the City Hospital, Dresden, on January 12, 1860. She had been ailing from about Christmas time, and about the New Year had to go to bed. She complained of debility, sleeplessness, loss of appetite, constipation, fever, and thirst. At first the fever was very intense, and the abdomen was distended and painful. Although there was no enlargement of the spleen, and rose spots were not present, the diagnosis of typhoid fever was made. Very soon there developed throughout the entire muscular system extreme pain, particularly in the extremities, so that the patient complained day and night. The arms and legs were held bent at the elbow and knee-joints, and could not be extended without the greatest pain. An œdematous swelling of the legs was present. Later a low typhoid pneumonia appeared; the patient became profoundly apathetic, and died on January 27th. The autopsy was performed the next day, and Professor Zenker says: "One can judge of my astonishment when I, in the first microscopical preparation made, saw at a glance dozens of non-encapsulated, free trichinæ in the parenchyma of the muscles." Further investigation showed the muscles to be swarming with the worms. There was no involvement of the Peyer's glands. In this case Zenker determined two other very interesting points, namely, the presence of the living adult trichinæ in the intestines, and he also found muscle-trichinæ in the flesh of the animal a portion of which the girl had eaten on December 21st. The publication of this classical case, in March, 1860, aroused the greatest interest; and clinically the discovery may be said to be the most important helminthological contribution of the century.

It was very soon determined that the disease was a very serious one, particularly in countries such as North Germany, in which the habit prevailed of eating swine flesh in a raw or only partially cooked state. The dread lest the disease should be carried by American pork has been the cause of no little friction between this country and Germany, though a few years ago Carl Fraenkel stated that it was very doubtful if any case of trichinosis had been caused in Germany by American pork. There is very little question, however, that in this country the hog is more frequently infected with trichinæ than in Germany. That the disease is much less common is owing altogether to the habits of the people, only a small number of whom eat pork in a raw or partially cooked state. In the hospital wards I fear we see cases without recognizing their nature.

The following is the abstract of the histories of the cases:

Case I.—Robert T., an Englishman, aged twenty-eight years, admitted March 3, 1896, complaining of pains in the body and fever. There was nothing special in his family or personal history.

The patient had been out of work for three months, during which time he had been in Waterbury, Conn., New York, and Philadelphia. He had been in Baltimore for two weeks, had been a good deal exposed, and had had insufficient food.

Present Illness. For six or seven weeks he has had vague pains in the muscles of the legs, which felt tired and as though they had a ton weight, as he expressed it, attached to them. He had no diarrhœa or vomiting, except on one occasion, when he vomited after he had eaten something that had disagreed with him. For two weeks he had been much worse, had a very full feeling in his head; he had no chill, no cough. He had walked about each day, but had felt that he was getting weaker, and this morning on coming to the hospital had to be assisted.

On admission the temperature was 102°, pulse 104, respirations 24. He was a well-nourished, medium-sized man; lips and mucous membrane pale, tongue heavily coated. There were tenderness and hyperæsthesia everywhere, and the patient groaned when any motion was made. The heart's action was rather forcible, and he had an apex systolic murmur. The spleen was not palpable. The abdomen was tender; there was gurgling in the right iliac fossa. On the following day the diazo reaction was found to be present in the urine. The temperature rose in the night to 104.5°, and we regarded the case as one of typhoid fever. For the next four days his temperature ranged from 102° to 104°; the tongue was very heavily furred. The spleen could not be felt, and there were no rose spots. He complained only of muscular pains.

A very careful examination of the blood was made on March 5th. The leucocytes were 17,000. A differential count by T. R. Brown, the clinical clerk, gave a percentage of polynuclears, 55; transitional, 1; mononuclears, 4; lymphocytes, 3; and eosinophiles, 37.

On March 7th Dr. Thayer noted that the patient complained of general soreness and tenderness, also soreness in the gluteal region on pressure. The spleen was not palpable; there were no rose spots. The diazo reaction persisted. On March 9th the patient looked very dull and heavy, and the tongue was dry and coated. The pulse was 96, tension rather low. The patient still complained very much of pains in his muscles and in various parts, particularly in the right arm on pressing the biceps. He also flinched on pressing the muscles of the legs and thighs. Up to this time we had regarded the case as probably one of typhoid fever. There was no œdema of the eyelids.

On the 10th and 11th the temperature was lower, and reached normal. The soreness, however, persisted, and on the 12th at noon Dr. Parsons excised a piece of the biceps muscle of the left arm, in the most tender region. Numbers of trichinæ were found in the examination of the fresh teased muscle.

From this date on the patient did remarkably well, and the fever subsided, though until the 23d there were still slight daily elevations. He presented at no time any œdema of the face or eyelids, but after he got up, at the beginning of April, he had swelling of the ankles for several days. He remained in the hospital through April and until the 13th of May. He improved progressively, but walking about a great deal tired him. The study of his blood by T. R. Brown to the date of his discharge is given fully in his paper.[1] The eosinophilia persisted, and on the day of his discharge the percentage was 16.8.

Case II.—Emile B., aged twenty-nine years, a sailor, of German nationality, admitted April 15, 1897, complaining of chills and fever, muscular pains, and weakness. The patient had been on a steamer sailing between Baltimore and Cuba.

Present Illness. He dated his illness from the first week in April. It set in gradually with loss of appetite, muscular weakness, and uneasy, painful sensations in the abdomen. He had headache for the first time on April 9th, which continued until admission. The bowels were regular until the day of admission, when he had two liquid stools. On the 10th he noticed a rather sudden œdema of the eyelids and face, which caused him some discomfort and some pain on opening and closing the eyelids. Since the 11th there had been pain in the muscles of the back, in the calves of the legs, and, while eating, in the muscles of the jaws. He thinks he had fever, and he had shaking chills at intervals. On shipboard the patient ate mostly salted meats, but had frequently eaten raw sausages, but never raw ham. His temperature on admission was 103°, and rose by 8 P.M. to 105.5°. The pulse was 120, slightly dicrotic.

The patient was a very well-developed man, with good color. The upper eyelids looked a trifle redder than the face and were a little swollen; no œdema elsewhere. On opening and closing the mouth he had slight pain and stiffness at the angles of the jaws; no pain on pressure in the muscles of the calves or in the arms. He drew a deep breath without pain. The spleen was palpable. There were two slightly suggestive rose spots seen. There was no glandular enlargement. On the morning following admission his temperature dropped to normal, and, as he had just come from Cuba, malaria was naturally suspected, and the blood was examined with great care, but was negative. On the day of his admission the blood showed 13,000 leucocytes per c.mm.; red blood-corpuscles 5,000,000 per c.mm. A differential count of the leucocytes by Dr. Futcher showed 44 per cent. of eosinophiles.

On the 16th, 17th, and 18th the temperature was typically intermittent, rising each day to about 105° and sinking to normal, or, as on the 19th, to subnormal. We were still very suspicious of malaria, but

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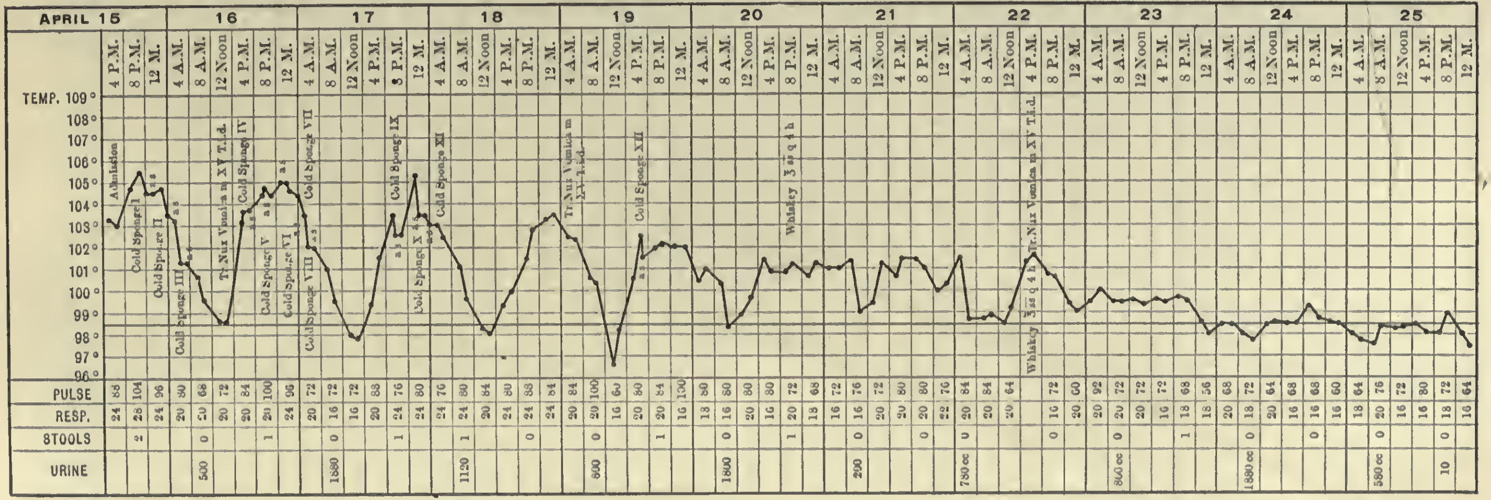
[1] Journal of Experimental Medicine, 1898, vol. iii.

CHART I. CASE II.



repeated examinations of the blood by Dr. Thayer showed it to be without parasites or pigment. The differential count of the leucocytes by Dr. Futcher showed 42 per cent. of esoinophiles. On the 18th the spleen puncture was made with negative results so far as parasites were concerned. There was no Widal reaction.

After the 20th the temperature did not rise above 102°, and on the 24th fell to normal. He had very little pain in the muscles after the first few days in the hospital, and we were in considerable doubt as to the nature of the case. The persistent increase in the esoinophiles suggested trichinosis, and the stools were examined with great care, but no parasites were found.

On the 21st Dr. Young excised a portion of the muscle, in which the trichinæ were found by Dr. T. R. Brown, who in his paper on the condition of the blood in trichinosis deals very fully with the blood condition in this patient also.

After the 24th there was no further fever, and he made a very satisfactory convalescence. He left the hospital on May 18th.

One interesting point which may be mentioned in his case was the low morning temperature which he had for weeks. For several hours each morning it was between 96° and 97°.

Case III.—John H. Y., aged forty-seven years, a German, admitted December 31, 1897, complaining of headache, pain in the left side, chilly sensations, and swelling of the feet. He had been in the hospital in July of 1897 with typhoid fever—a moderately severe attack. The blood on his second admission gave the Widal reaction.

The patient lived with his German employer, and frequently had eaten sausages and other forms of pork insufficiently cooked.

Present Illness. Five weeks ago he began to have frontal headache and cough. It followed exposure and a thorough drenching. He does not think that he had fever. His work required him to be up at 3 A.M., and for the past five weeks he has had a coughing spell each day just after rising. He also vomited, which gave him some relief. He had not had any bleeding from the nose, nor chills. Five days before admission he had diarrhœa, four or five stools daily, associated with griping pains in the abdomen. For two or three days after this he noticed pain and numbness in the legs, feet, and arms, and the skin on these parts felt tight and cold. About the same time he noticed stiffness of the knees and elbows and other joints, and he thought that his legs and feet and arms were a little swollen. His employer called attention to the fact that his eyelids were swollen. He evidently could not have been very ill, for he kept at work until the day before admission. He had, however, to be helped to the hospital.

On admission the patient looked well nourished; the eyes were suffused, reddened, and the eyelids puffy. The temperature was 102.5°, the pulse 112, respirations 32. The abdomen was a little swollen, but not tender. There were no rose spots. The spleen could not be felt.

On the 22d the temperature ranged between 100° and 103°. He complained of pains in the arms and legs, which were particularly severe at night. There was slight tension of the skin, as if the muscles were swollen.

Shortly after admission the blood, examined by Dr. Gwyn, was negative for malarial parasites, but there was a great increase in leucocytes, 34,000; eosinophiles, 45 per cent.

"I saw this patient at the ward class, and there were two or three points about the case which impressed me very much: in the first place, the puffiness of the eyelids and the suffused, puffy condition of his face. The hands were quite cyanotic and looked a little swollen. He made a fist with difficulty. The muscles of the forearm were quite tender and looked a little swollen, and in places there was a slight erythema of the skin. This was especially the case in the bicipites, which were very sore. The feet were livid; the legs were very stiff on attempting movement. The muscles of the calves were not specially tender. The stools were examined with care, but were negative. The following day the muscular sensitiveness had diminished considerably. I made a careful examination of the individual muscle-groups without finding any extreme sensitiveness. The stools were examined, and the eggs of the common ascaris were present in considerable numbers, but no trichinæ. He had a purge the evening before. On the 23d a small piece of muscle was removed. The urine contained neither albumin nor sugar; there was no diazo reaction.

The temperature fell to normal on the 24th, and for the next week there was an occasional rise to 100°. After January 2d the temperature remained low. For days it did not reach 98°, and the morning record was sometimes 96°. By the 24th the blueness of the hands and feet had disappeared; there was still a little puffiness of the forearms. Following the purge he had some diarrhœa, which, however, was checked by the 25th.

In the hardened specimen of the muscle the parasites were found in the early stage of development. The differential count of the leucocytes by Dr. Gwyn showed a maximum of eosinophiles on January 10th of 50 per cent. The range was constantly above 40 per cent.; and on his discharge, January 16th, quite well, the leucocytes were 8000 and the eosinophiles 48.3 per cent.

Case IV.—John L., an American, aged thirteen years, admitted August 4, 1898, complaining of headache. There was nothing special in his family or personal history.

He had always been a very healthy boy; is a huckster by occupation.

Present Illness. He began to feel badly on Saturday, July 30th. On the following day he had bleeding at the nose. The headache continued through Monday and Tuesday. On Saturday he also had pains in his legs. His bowels had moved regularly; he had had no chills and no vomiting or nausea. He complained of nothing but the headache and the pains in his legs.

On admission he was a healthy looking boy, with good color. He had a rather dull facial expression. The tongue was coated. The eyelids were somewhat swollen. The temperature was 100°, pulse 108, respirations 28. There was no swelling or tenderness of the abdomen, no rose spots; the spleen was not palpable. On the following day he seemed much better; the temperature was only 100°; he had a very dull, heavy expression, suggestive of typhoid fever. The tongue was thickly coated. The edge of the spleen was readily to be felt below the left costal margin. There were no rose spots. There was a good deal of gurgling in the right iliac fossa. The Widal reaction was not present. There was no diazo-reaction in the urine. He had no diarrhœa.

For the first week in hospital there was really nothing to attract attention about this case. It looked like a mild case of typhoid.

On August 8th, however, it was determined that he had a marked leucocytosis, above 18,000, and this rather excited the attention of Dr. Thayer, as it is so rarely met with in this disease. A differential count showed that 48 per cent. of the leucocytes were eosinophiles. A more careful examination was then made of the muscular system of the boy, but nothing further was elicited; there was no tenderness, no swelling.

On August 11th a piece was excised from the muscles of the right calf. Dr. Brown had found from previous experience that if only a small piece of the muscle was taken it was safer to harden it and make serial sections for the examination of the worms. This was done, and trichinæ were found in it.

On August 13th a differential count of 300 leucocytes gave polynuclears 43 per cent.; small mononuclears, 7.3; transitionals, 1.7; eosinophiles, 48. The boy was discharged August 20th, feeling quite well.

Case V.—Herman W., a German, aged twenty-seven years, was admitted Wednesday, November 9, 1898, complaining of thirst, heaviness of the limbs, and pain in the chest. There was nothing in his family history of special moment.

Personal History. He had been singularly free from illnesses; had been a temperate and very healthy man. During August of this year he had an attack of nausea and vomiting; no diarrhœa. He drinks very little milk, eats no oysters, and says he has been in the habit of eating raw and smoked pork, having used it on several occasions just before the onset of present illness.

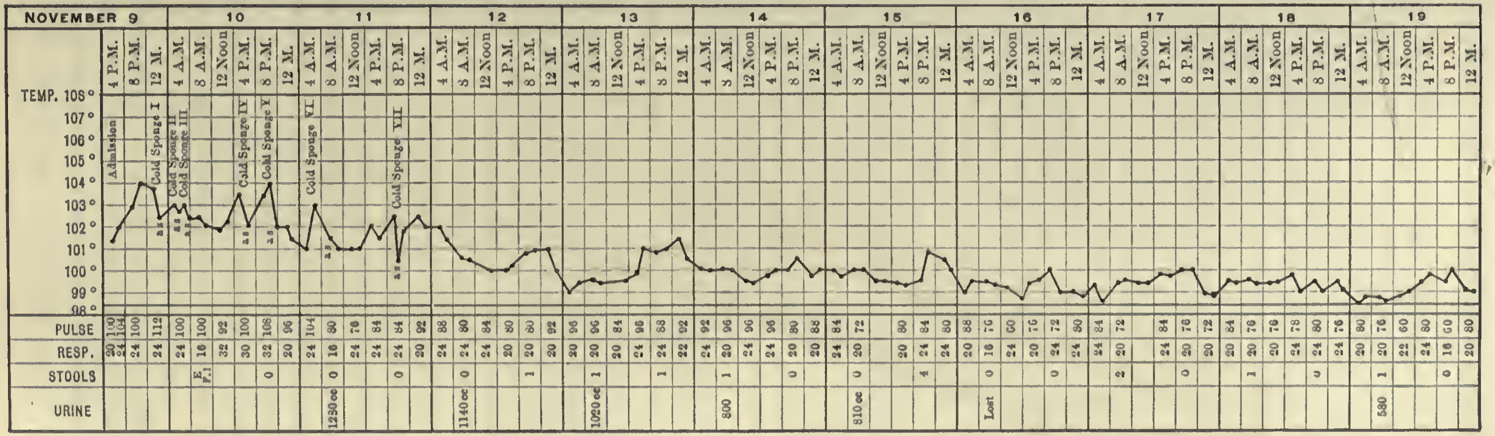
Present Illness. Ten days ago, about October 30th, he began to have headache, which has persisted. He has also had alternate chilly and warm sensations, which would come on several times each day. He had some pain in the chest, with cough, and a feeling of heaviness and aching in the bones. On two occasions he had slight bleeding from the nose. During the first five or six days of his illness he vomited a good deal. He says that for a week he had no movements from the bowels; lately he has been irregular; has had no diarrhœa, but has had some soreness in the abdomen.

When admitted he looked like a healthy, well-nourished man, rather pale, and he was perspiring profusely. The temperature was 101.5°, and rose in the evening to 104°. The pulse was 100, full, bounding, and dicrotic; respirations 20. There was no glandular enlargement. There was slight puffiness of the eyelids in the early morning. The superficial glands seemed slightly enlarged, not tender. Examination of the heart and lungs showed no special changes. The abdomen was natural looking, on palpation everywhere soft, slight tenderness in the region of the navel. There were no rose spots. The spleen was not palpable.

On November 10th he looked rather dull and heavy. The temperature ranged between 102° and 104°. The Widal reaction was not present. The blood examination was negative for malarial parasites. On examination of the fresh specimen, Dr. Gwyn noticed an enormous increase in the eosinophiles. This, with our previous experience, at once called attention to the possible nature of the case. Then, on careful testing, it was noted that he had slight tenderness of the calf muscles.

November 11th the temperature ranged between 101° and 103°. The

CHART II. CASE V.



tongue was moist, with a thick coat. The abdomen was not distended, nowhere tender. At the left costal margin in the nipple line there was a slight reddening of the skin over an area about 3.5 by 2.5 cm. The spleen was not palpable. The patient complained of some stiffness of the legs, and there was slight tenderness on pressure in the calf muscles. There was no diarrhœa. He had perspired at night very profusely.

On November 12th there was still slight œdema of the upper eyelids, and on pressure the muscles of the arms and forearms, the pectorals, and those of the calves of the legs were quite sensitive, and he complained of a more or less constant pain in them. I noted on the 12th a slight swelling of the thyroid. The differential counts gave a leucocytosis on different occasions of from 14,000 to 17,000 per c.mm., and the eosinophiles from 22 to 36 per cent.

On the 13th and 14th he had loose, fluid stools, which were very carefully examined for adult trichinæ, with negative results. On November 14th a piece of the right gastrocnemius muscle was removed for examination.

On the 16th a note by Dr. Futcher reads: "Puffiness of eyelids not quite so marked. There is still considerable tenderness complained of. The temperature has been falling since the 11th, and for the past two days has ranged between 99° and 100°. There are no rose spots. The spleen is just palpable at the costal margin on deep inspiration. There is marked pallor of the face; lips and conjunctivæ are slightly anæmic." From this time on, the patient made very good progress. The temperature became normal on the 20th, and there have been slight elevations since to 100°. There has been slight tenderness of the muscles. The stools have been examined repeatedly, but have been negative for parasites; but on the 18th there were rather numerous Charcot-Leyden crystals.

On November 21st he complained of a good deal of stiffness of the legs.

On November 26th the prepared sections of the piece of muscle were ready for examination, and parasites were demonstrated in the specimens, in one section as many as four or five found. On December 14th, after the patient had been up and about for three weeks and had gained in weight and in color, the leucocytes were still about 20,000 per c.mm., and of them the eosinophiles were more than 60 per cent.

The symptoms in a case of sporadic trichinosis may be quite as distinctive as when a whole series of cases occur in rapid succession in a household or in a community. But this is not always so, and the remarkable discrepancy between the clinical and anatomical experience shows that we must frequently overlook the disease. The special interest of the small series of cases here reported rests with the fact that, while all were of moderate severity, the diagnosis was suggested by the blood examination and confirmed in each case by examinations of the muscle.

The clinical features of the disease are conveniently grouped into those associated with growth and development of the parasites in the intestines and those which follow the migration of the young brood into the muscles.

Gastro-intestinal Symptoms. Several days elapse after the ingestion of the trichinous pork before the larval muscle trichinæ reach their sexual maturity, and two or three days before the female gives birth to the embryos. During this period the patient frequently has severe symptoms—nausea, vomiting, and diarrhœa, with colicky pains in the abdomen. In large epidemics there have been a few cases in which the disease assumed a choleraic type.

The gastro-intestinal features of the five cases may be briefly summarized:

In Case I. there was no nausea or vomiting to speak of; no diarrhœa. Headache at onset and general diffuse pains in the joints, bones, and muscles were the chief complaints.

In Case II. there were loss of appetite, uneasy sensations in the abdomen, no nausea or vomiting, and the bowels were quite regular until the day of admission. He had headache, but not severely.

In Case III. the first complaint was of headache and cough. He vomited once, and for five days before admission he had diarrhœa, with griping pains in the abdomen. There were pains in the legs and arms and stiffness in the joints.

In Case IV. headache was an early and persistent symptom; he also had epistaxis; the bowels were regular; he had neither nausea nor vomiting; pains in the limbs were present.

In Case V. the patient vomited a good deal at the onset of the illness. He was constipated for a week, had no diarrhœa, but had slight soreness in the abdomen.

Practically, then, in these five cases the gastro-intestinal symptoms were not marked at the onset. In only one were they at all severe. This is in striking contrast to the records given in the epidemics of the disease, in which, as Niemeyer states, "the absence of intestinal symptoms, as well as of the severe attacks of vomiting and purging, is exceptional."

Symptoms of Invasion. Pains in the joints, bones, and muscles. All of the patients complained of irregular pains in the muscles and joints and back at the onset of the disease, more particularly of pains in the legs or of general heaviness in the limbs, and aching in the bones. These symptoms may be not more than those usually associated with an acute infection, and they are different from the pains subsequently complained of, which are confined more particularly to the muscles.

Of all the symptoms of invasion, fever is the one which is most apt to lead to error in diagnosis in the sporadic cases. This, with the accompanying phenomena of rapid pulse, headache, stupor, and general symptoms of serious illness, suggests to the physician the diagnosis of typhoid fever, as was the case in Zenker's patient. According to Strümpell, the temperature may for a time reach 104° or 106°, but the fever is seldom continuous for any length of time, being usually interrupted by frequent and considerable intermissions. Niemeyer speaks of the fever as high, with slight morning remissions, and says that it very closely resembles the curve of typhus and other infectious diseases. He states, in addition, that occasionally the temperature curves can scarcely be distinguished from those of typhoid. Eichhorst speaks of the fever as chiefly of the remittent type, simulating very often the curve of typhoid fever.

In Case I. during the first five days in hospital the temperature presented only slight daily remissions. It ranged from 101.5° to 104.5°; then on the sixth, seventh, and eighth days it became very irregular, touching normal or near to it each day. Then for a week there was very slight fever, from 99° to 101°, after which the temperature remained normal for the greater part of the day, though for three or four weeks there was on some days a slight evening rise to nearly 100°. Altogether the temperature-curve in this case resembled very closely that of a mild typhoid fever.

Case II. presented a very remarkable temperature-curve. (See Chart I.) Several writers have referred to the intermittent form of fever in trichinosis, and this patient, as shown in the chart, had very typical paroxysms for the first four days. On the first day the temperature rose to 105.5°, and between 8 P.M. on the 15th and 10 A.M. on the 16th had fallen to normal. Then, without a chill, it rose in the afternoon of the 16th to 105°, and again dropped with a sweat to 97.7° by noon of the 17th. Two similar paroxysms followed on subsequent days. Then there was slight, irregular fever for six days, and the temperature reached normal and remained so. During convalescence he had very low morning temperature for several weeks; sometimes it was 96°, more frequently 97°. In this case the typically intermittent character of the fever made us at first suspect malaria.

Case III., the patient who really had the most serious local symptoms in the muscles, had a very moderate fever. On the second day after admission it rose to 103°; on the fifth day it touched normal; then there was for three or four days a slight rise to 100.5°. Then, after the eighth day in the hospital, the temperature remained normal. He also presented during convalescence persistent low temperature. For days in the four-hourly temperature-chart the fever did not rise above 97°.

In Case IV. the fever was very slight. For four days there was a little fever, the temperature ranging to 100°; then it became normal.

Case V. had a fever-range very suggestive of typhoid fever. (Chart II.) Shortly after admission it reached 104°, and the diurnal variations for three days were not more than 2°, in spite of the spongings, which were carried out under the belief that he had typhoid fever.

The temperature, however, did not touch normal until about the tenth day in the hospital, and he then had for three or four days a slight rise to 100° before it became quite normal.

The pulse-rate seemed to be dependent more upon the height of the fever.

The respirations were sometimes increased out of proportion to the fever.

In several points the similarity of the disease to typhoid fever is very striking. Of the features of onset, headache, general malaise, and pains in the bones and limbs are very suggestive. It will have been noted that headache was complained of very much by four of the patients.

More suggestive still are the gastro-intestinal symptoms—slight diarrhœa and pains—which were severe in only one case of this series.

Epistaxis was noted in Cases IV. and V. Altogether the symptoms of onset in all of the cases here discussed were those which we meet with in typhoid fever. With the exception of Case II., the temperature-curve also resembled typhoid fever. Enlargement of the spleen was met with in three cases, and, with the preliminary features spoken of, tended to confirm the diagnosis of typhoid fever.

Ehrlich's diazo reaction was well marked on admission in three cases, suspicious in one, absent in one on admission, but developed three days later. In one of the cases there were two "suspicious" rose spots.

There are in trichinosis three features of great value in diagnosis. Two of these are well known, and the third has been brought out by a careful study of the blood in these cases.

1. *The Muscular Pains and Swellings.* While in typhoid fever it is by no means uncommon to have aching of the limbs and back, it is exceedingly rare to have special complaint of pain in the muscles themselves. When pronounced, as in Case III., early in a febrile affection, this is one of the most suggestive symptoms of the disease, but it may be slight, as in Cases I., II., and V., and not enough to attract the particular attention of the attending physician, as in Case IV. In a very severe infection the swelling and hardness of the muscles, the extreme pain on pressure, the position of flexion of the arms and legs, without any redness or swelling of the joints themselves, are almost pathognomonic. Early in typhoid fever these pronounced symptoms in the muscular system are never seen. At the height or late in the disease, however, there may be swelling and tenderness of the muscles of the legs and, indeed, of the arms. I have referred to a number of such cases (*Studies in Typhoid Fever*, ii. pp. 399–401), which are probably examples of neuromyositis.

2. *Œdema.* In its most characteristic form this is seen in the eyelids and over the eyebrows, and it is of great value as a symptom, because of its very early appearance in trichinosis and because of its extreme rarity—or, rather, complete absence—in typhoid fever. It was

present in characteristic form, however, in four of our cases. In the hands and feet it is more commonly seen late in the disease. An important form is that which occurs over the affected muscles, as in Case III. The œdema, with slight erythema, above the swollen, tender muscles, was very characteristic.

3. *Leucocytosis and Eosinophilia.* So far as I know, the state of the blood in trichinosis has not received any special attention. For several years past Dr. Thayer has been making a careful study of the leucocytes in typhoid fever, so that in Case I., admitted March 3, 1896, when after two days the symptoms were doubtful, a careful blood count was made by Dr. T. R. Brown, at the time one of the clinical clerks, who found the leucocytes 17,000 per c.mm.—a point in itself almost excluding typhoid fever early in the disease. But, what was much more extraordinary, in making the differential count he noted a great increase of the eosinophiles; instead of a normal 2 per cent. solution there were 37 per cent.—a most remarkable and unusual condition of the blood. Nothing could be added to Dr. Brown's careful and elaborate study of the state of the blood and the changes in the muscles in this disease.[1] The eosinophilia persisted in this case, and the percentage reached, on April 23d, the extraordinarily high figure of 68.2 per cent. On that date there were 17,700 leucocytes, so that more than two-thirds of them were eosinophiles. When the patient left the hospital, on May 12th, the eosinophiles still formed 16 per cent. of the leucocytes.

While it seemed highly probable that the eosinophilia was definitely associated with the acute myositis, subsequent observations could alone determine how far it was of value in diagnosis. The case made, however, a very deep impression upon us all. But in so rare a disease as trichinosis we did not expect for some time to have an opportunity to confirm the observation. Scarcely a year later, however, when Case II. was admitted, with a remarkable intermittent fever without the presence of malarial parasites, and the eosinophiles were found to be on the day of admission 44 per cent. and the following day 67 per cent., we became suspicious of trichinosis, and a portion of muscle was excised and the parasites were found.

Seven months later a third case was admitted—a man who had typhoid fever only six or eight months before. After his admission eosinophilia was determined—48 per cent.—and we were again put upon the scent, and the diagnosis of trichinosis was confirmed by the excision of a portion of muscle.

During the present year, in Cases IV. and V., the blood count, showing an enormous increase in the eosinophiles, was the most important point in the diagnosis, confirmed in each instance by the removal of a portion of muscle. Our experience in these five cases is, I think, of very considerable clinical import. The eosinophilia was pronounced in each case and accompanied by a marked leucocytosis.

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[1] Loc. cit.

There now remains the interesting question whether in other forms of acute infectious myositis the eosinophiles are greatly increased in number. Such cases are extremely rare, much rarer, indeed, than trichinosis, and if eosinophilia does occur with it, the final decision would rest with the examination of the portion of muscle. In the recent monograph, by Lorenz, on diseases of the muscles (Nothnagel's *Handbuch*, 1898, Bd. xi.), the condition of the blood in polymyositis is not referred to except in a case assoicated with erythema multiforme. The leucocytes were 4900 per c.mm. No mention was made of their varieties. Under cocaine the removal of a portion of muscle is a simple operation; and with the ordinary scalpel, not the harpoon, a small bit can be taken from the biceps, with little or no discomfort to the patient. The special trichina compressor, such as is used in Germany in the pork inspection, may be used; or, if only a small portion of the muscle is excised, it is best, perhaps, to harden and make sections of the entire piece, in which way there is no possibility of overlooking even a single trichina.

Routine blood examinations have added enormously to the work of house physicians and of the clinical clerks. It requires a great deal of time, if done carefully and conscientiously; and when it comes to the question of differential counts of the leucocytes, if the service is at all heavy with acute cases, the added labor is really very serious. Should eosinophilia prove to be, as we believe, an important diagnostic sign of trichinosis, this labor will not have been in vain.

A CASE OF SYRINGOMYELIA WITH UNUSUAL SYMPTOMS.

AUTOPSY: MICROSCOPICAL EXAMINATION.

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and
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The ordinary types of syringomyelia are well known, and are so distinct and definite that in most cases the diagnosis is not difficult or involved. In the case I now present the symptoms did not even suggest syringomyelia, and the diagnosis, while reserved, seemed to be more probably of a quite different character.

The patient, a boy, six and a half years old, first came under my care (Dr. Bullard) in my service at the Carney Hospital on March 8, 1895, and from that time until his death he was under my observation.

The history, as obtained from the patient's mother, follows.

Family History. The father has been dissipated; he shows no evidence of syphilis. Now has pulmonary tuberculosis. There is no evidence of any disease of the nervous system in his family.

The maternal grandmother of the patient died of phthisis. The mother is healthy. Evidence of any disease of the nervous system in her family is absent. She has had no miscarriages. Has had two other children—a boy, eight years old, who is very nervous; is at times cyanotic about the lips, and is subject to nocturnal enuresis; and a girl who died of diphtheria. Family history otherwise negative.

Previous History. The labor was perfectly normal; no instruments were used; the head presented, and the child was not asphyxiated. His head, however, was noticed from birth to be of a peculiar shape.

As a baby he seemed perfectly natural. He began to cut his teeth at six months, to talk at ten months, and to walk at sixteen months. He had various diseases of childhood, but otherwise seemed perfectly healthy until three years old.

Since the age of three years he has suffered from attacks of frontal headache, which occured about every three weeks. For two years or more these attacks have been accompanied by vomiting, which sometimes seemed to relieve them. The vomiting has no direct relation to the ingestion of food. Both the vomiting and the headaches have gradually become more frequent, and for the past five or six weeks have occurred almost every day. Last January it was noticed that his sight was growing poor, and at this time he was taken to the out-patient department of the Boston City Hospital for treatment.

He then complained principally of the headaches and vomiting. The sight rapidly grew worse, and for a few weeks he has been totally blind.

About five years ago—date uncertain—he fell ten feet, striking his head on the stairs. He did not lose consciousness, but was dazed for a few moments. No special symptoms were noted afterward. He went out the same day and walked well. The headaches and vomiting existed previously.

About the 1st of January, 1895, he began to have attacks of dizziness in which he would fall, but did not lose consciousness. His mother thinks that he usually fell backward and to the right. About January 28, 1895, he had a spasm in which his head was thrown back. There was no loss of consciousness. His eyes were open. There were no spasmodic movements of the extremities. Disturbance in gait was first noticed early in January, 1895, when it was observed that he staggered in walking.

His general condition when seen at that time was good. He ate well and slept fairly, but had attacks, said to be "pavor nocturnus."

On February 1, 1895, while in the Boston City Hospital, he had an "epileptic attack," in which he began to beat his head with the right hand, then with both hands, and at the same time to move his right leg. He was unconscious during the attack, which lasted about twenty minutes.

Present Condition. He is bright and intelligent, and his memory is unimpaired; he has always learned easily and remembers what he learns. His gait is staggering, and his knees seem to give way under him. There is no incontinence of urine or feces. His appetite is good and his bowels regular. Temperature 99°, pulse 60.

Physical Examination. He is well developed and well nourished. There is a depression of the right parietal bone about the middle of the vertex, just external to the sagittal suture; there are no cicatrices over the scalp. He is totally blind; the pupils are dilated and do not react to light or accommodation. There is possible slight paresis of the left abducens, as the left pupil does not move outward to the full normal extent. Actual paresis of the right abducens exists; the right pupil does not pass outward much beyond the median line. There is no ptosis and no other evidence of any affection of the third nerves. On conjugate movement both eyes turn inward to the full extent. Hearing is normal; there are no ear symptoms. There is no paresis of the face. The tongue is normal, as is the soft palate. The heart, lungs, and abdominal organs show no abnormal signs. The spine is normal. The epiphyses at the wrists are somewhat enlarged; there is no marked rosary. The limbs appear normal, and the grasp is good. The knee-jerks are normal, and ankle clonus is not present. There is no tenderness over the lower extremities. Sensation is normal.

The urine contains no albumin or sugar; it is slightly acid; specific gravity 1020. Alkaline phosphates increased.

The sensation was examined three times—once by Dr. Thomas at the City Hospital in January, and twice at the Carney Hospital—once by Dr. Bullard personally—and was on each occasion found to be normal. It is doubtful, however, whether it was tested for heat and cold.

March 10, 1895. Dr. Kilburn reports: "Optic atrophy o. u. secondary to papillitis of intense severity. Retinal veins much congested and distorted. Retinal arteries greatly shrunken." In January Dr. Lancaster reported: "Subsiding optic neuritis and beginning optic atrophy in both eyes." The sense of smell was not impaired.

20*th.* He is comfortable except for occasional headache. Has vomited at times with the headaches.

28*th.* Occasionally wakes up at night with a loud cry.

April 22*d.* No material change. Lies in bed most of the time. Suffers little pain.

May 1*st.* Has improved since admission. Vomits less frequently and walks better, staggering less.

June 6*th.* Gets up every day, and is about the ward. Bright and cheerful.

August 1*st.* Severe occipital headache. Head much retracted.

28*th.* Very obese. No pain. Runs about ward. Eats and sleeps well.

September 2*d.* Discharged relieved.

On the next day, *September* 3*d*, he was admitted to the Children's Hospital. No special new facts were recorded in the history. At that time it was again noted that he was very fat. The knee-jerks were normal. There was no incoördination.

7*th.* Seen by Dr. Bullard, who reports: "No indication for operation."

12*th.* Attempted to walk down the ward; his steps became uncertain; he fell, and, although conscious when picked up, he soon became unconscious, and remained so one-half hour. During unconsciousness pricking with a knife caused movement except when done below the knees—

here there was no reflex, even when the knife was thrust through the skin.

14th. Headache this afternoon. More sleepy than usual.

17th. Has complained of being tired, and has lain down most of the morning. This afternoon, while walking, his legs became a little shaky, and he would have fallen if he had not been caught. When placed upon his feet he held his legs stiff, and if unsupported tended to fall in any direction, like a stick.

Intelligence retained. Said that he did not feel dizzy, and was "all right, except that his legs were weaker."

21st. Headache. Seems well otherwise.

28th. Headaches more frequent. Frequently unsteady when upright.

October 3d. Headaches continue, and when they are present the boy is often stupid, and there are frequent vasomotor disturbances. Skin scarlet, sometimes all over the body, sometimes in blotches.

15th. No change.

28th. Every two or three days he stays in bed for the whole or part of the day on account of the headaches. Lies then on his side with his head very much retracted, and cries. Frequently shrieks with pain.

November 19th. Discharged.

April 16, 1896. Was readmitted to Children's Hospital. The symptoms are unchanged. He is still subject to the headaches and vomiting. The headaches may occur two or more times a day; but he is sometimes free from them for a week or more. There is frequently retraction of the head with the headache, and he sleeps with his head retracted. Is apt to cry out in his sleep. Walks easily, but staggers somewhat. Appetite good. Bowels regular.

Physical examination shows no special change except that there is now decided exophthalmos, with almost constant motion of the pupils, which react slowly to light. The patellar reflex is now absent. There is no paralysis of any limb and no incoördination of any of the extremities. The internal organs are normal. Urine normal.

27th. Ears examined by Dr. H. L. Morse, who found there was no central affection of hearing. There had been a slight reddening of the drum and canal.

Left facial paralysis affecting the mouth, cheeks, and eye was noticed to-day.

Lumbar puncture was attempted, but no fluid was obtained.

May 23, 1896. The facial paralysis is apparently intracranial. No reactions of degeneration were obtained. (Dr. Thomas.)

25th. Discharged.

On readmission, *December* 11*th*, he was more stupid than formerly and very obese. Uses upper extremities well. Sent from Kindergarten for the blind, where he has been living, because headaches and vomiting have lately been more frequent, and he has attacks of weakness, during which he cannot walk and has to be carried. Now has frequent flushings of the face.

16th. Hears watch in left ear on contact; in right ear at six inches. Left internal strabismus. He has no dizziness now, but cannot walk on account of weakness.

17th. Reacts normally to galvanism. No degenerative reaction.

The obesity was now so marked that thyroid extract was given, but without effect. The eyes were very prominent, but there was no goitre.

January 21, 1897. There is now paralysis of the lower extremities, which has reached such an extent that the child cannot stand.

22*d*. Cannot raise himself in bed, nor can he raise his legs. Knee-jerks absent since April, 1896.

23*d*. Incontinence of urine and feces. Can move hands and arms, but there is loss of motion of the facial muscles. Complete sensory paralysis as high as the second ribs and over the inner surface of the arms.

27*th*. No change until to-day, when he had headache and paresis of the arms, which passed off during the day. Exophthalmos increasing; left eyelid does not close over the eye. General myxœdematous condition of the skin. Sleeps a great deal.

29*th*. Speech is normal. Sensation returning to legs and trunk; motor paralysis continues.

February 7*th*. Headache for the last three or four nights, not relieved by morphine.

After this practically no change occurred until March 1st, when a small slough appeared over the coccyx. During the next three weeks other sloughs appeared over the trochanters and the right anterior iliac spine. Skin elsewhere more natural in appearance. From this time on the ulcers slowly healed, but there was otherwise very little change in his condition.

July 25*th*. There is now left internal strabismus. The facial paralysis has disappeared. There is, however, total paraplegia of the lower extremities. The thighs are drawn up on the abdomen and the legs are flexed on the thighs.

August 6*th*. Transferred to-day from the Children's Hospital to the Carney Hospital. The general condition is much the same as before. The mental condition has always been good, the mind clear, and, in spite of his pain and blindness, the patient has been uniformily cheerful and sweet-tempered.

There is no paresis of the face. The tongue, which is not tremulous, is protruded straight. The upper extremities are not affected in any way. There is total paraplegia of the lower extremities, with flexion at the hips and knees. Incontinence of urine and feces. Ankles and feet œdematous. Bedsores as above noted. Urine negative.

The patient continued in much the same condition—cheerful, contented, and with fair general strength—until October 18th, when he began to breathe heavily, became comatose, and died.

The autopsy made by Dr. Thomas showed:

Body of a boy apparently about ten years old. Panniculus adiposus well developed. Rigor mortis marked. Dependent portions of the body livid. A large ulcer, 10 to 12 cm. in diameter, over the sacrum.

Abdominal cavity normal. The mesenteric lymph-nodes are enlarged, many of them being 1 cm. or more in longest diameter. On section they are reddened.

Pleural cavities and pericardium normal.

Left lung œdematous, but otherwise normal. In the posterior portion of the lower lobe of the right lung there are several small, reddish-gray areas, firmer than the normal portions of the lung, varying in diameter from 2 cm. to 5 cm. From the cut surface a frothy fluid can be squeezed in small amounts.

Heart-valves and cavities normal.

Spleen slightly enlarged; dark-red on section. Trabeculæ and follicles distinct.

Stomach normal.

Intestines. In the lower part of the ileum there are six or eight small ulcers, nearly circular, about 1 cm. in longest diameter, with fairly clear-cut borders and reddened bases.

Bladder is normal and contains about 100 c.c. of cloudy urine. Kidneys are normal in size. Cortex injected. Glomeruli fairly distinct. Capsule peels readily.

Pancreas and suprarenals normal.

Brain. Surface moderately injected. The ventricles are considerably enlarged and filled with clear fluid. The iter is markedly dilated, as is also the fourth ventricle. Otherwise the brain appears normal. There is no tumor to be seen on section of the cerebrum or cerebellum.

Cord. The cord is larger than normal. The membranes are not injected and appear normal. On section of the medulla and cord there is seen to be a cavity in the gray matter, beginning in the median line posterior to the central canal at a point a little above the upper olives. This cavity seems to have no communication with the central canal. At the level of the lower part of the pyramidal crossing there can be seen three cavities grouped about the central canal, one posterior and one on each side. About 1 cm. below the pyramidal crossing the single cavity broadens out and extends across the commissure, and on the left side extends well back into the posterior horn. Just below this there are two cavities, one in each posterior horn. The right cavity ends at the level of the first cervical segment. The left cavity continues in the left posterior horn, increasing in size to the second cervical segment. In the next segments the cavity occupies the same position, but is larger, until at the fifth cervical segment it is a large space occupying the position of the commissure and both posterior horns, and distorting the cord. At the seventh cervical segment the cavity attains its largest size, leaving but a thin strip of cord tissue about it. From the fifth cervical to the first dorsal segment the central canal is lost. Below the seventh cervical segment the cavity, still occupying a central position, grows smaller, and at about the first dorsal segment splits into two cavities, one occupying the centre of the cord, with a smaller one to the left.

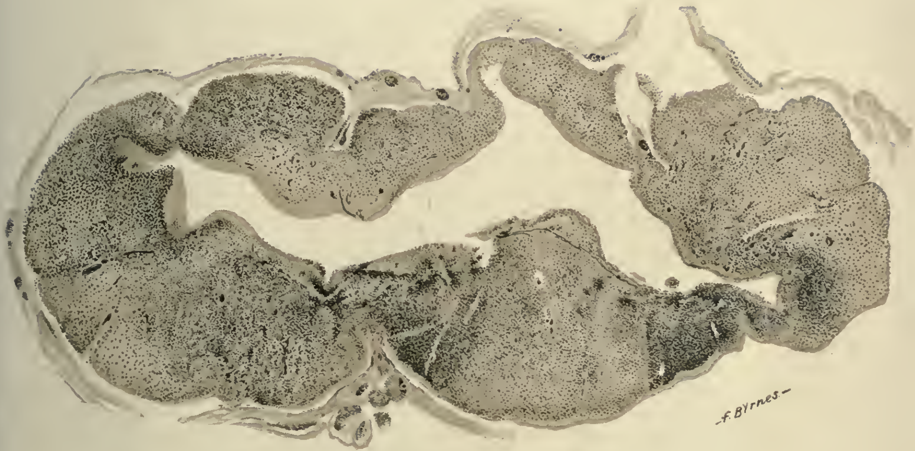
At the second and third dorsal segments there are two distinct cavities, one in each posterior horn—the left cavity the larger. At the fourth and sixth dorsal segments the left cavity becomes larger, extending across the median line in the gray commissure and into the base of the right posterior horn. The cavity in the right horn is smaller, and at the sixth dorsal segment the two cavities have united, forming one large one. At the eighth dorsal segment there is again a division into two large cavities. At the ninth dorsal segment the left cavity is larger and extends across the median line. The right cavity below this gradually diminishes in size and cannot be distinguished at the second lumbar segment. The left cavity enlarges considerably below the ninth dorsal segment, and although it again diminishes in size at the first lumbar segment it can be distinguished to about the level of the fourth lumbar segment.

Microscopical Examination. A section 5 mm. thick was taken through the middle of the cerebellum, divided into small pieces, and stained with

PLATE I.

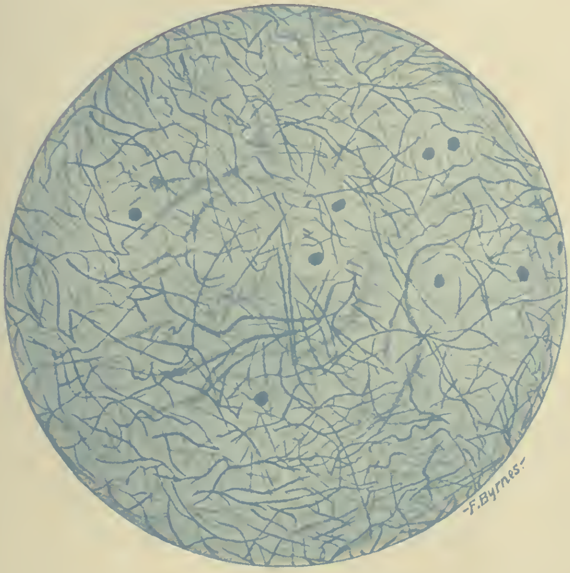
270'

FIG. 1.



Section from Level of Sixth Dorsal Segment.

FIG. 2.



Neuroglia from Border of Cavity. Zeiss: Oil Immersion; 2 mm.; Ocular 3

hæmatoxylin and eosin, but nowhere did the sections show an increase of nuclei or anything approaching the structure of a new growth. Sections of the cord were made at various levels and stained by Weigert's myelin-sheath stain, Pal's modification of this followed by Van Gieson's picric-acid and acid-fuchsin stain, by phosphotungstic-acid-hæmatoxylin, and by Mallory's method for staining neuroglia.

The sections at the level of the seventh cervical segment show a marked distortion of the cord, the centre being occupied by a large, irregular cavity, which has a border of moderate thickness, staining very poorly with connective-tissue stains. When stained for neuroglia the results are also poor, but in some of the sections the border of the cavity is seen at places to be made up entirely of a dense mesh-work of neuroglia fibres, with comparatively few nuclei. Many of these fibres are considerably thicker than the normal neuroglia fibres of the cord. Probably the reason the fibres stain so poorly, as a rule, is because of the length of time which elapsed after death before the removal of the cord. This cavity evidently occupies the whole of the posterior commissure and the posterior horns of the gray matter of the cord. It is not lined with epithelium. At this level the central canal cannot be made out. The substance of the cord is much distorted. The anterior horns are distorted and flattened, but show a good number of nerve-cells which are practically normal, though some are distorted in shape, and others appear smaller than normal. Occasionally a nerve-cell, very slightly changed, with distinct nucleus and nucleolus, can be found embedded in the neuroglia about the cavity. The posterior part of the posterior horn is also fairly normal, though much flattened and distorted. The white substance of the cord in all parts shows a diffuse and very marked degeneration of fibres, with loss of the myelin sheaths. This is most marked, however, in the lateral and anterior pyramidal tracts and in the median portion of the posterior tracts (columns of Goll), where there is scarcely a single normal nerve-fibre. There is, however, a marked degeneration in all the remaining portions of the white substance at this level.

There is a considerable increase of the neuroglia throughout all the white matter of the cord. The anterior and posterior nerve-roots appear practically normal. The membranes are moderately thickened by increase of fibrous tissue.

Sections from the upper dorsal region about the level of the second dorsal segment show the two cavities, one in each posterior horn, each extending well up to the commissure, but not into it. The central canal is normal. The posterior horns are nearly destroyed; distorted remains of the substance of Rolando only can be distinguished—more plainly on the right side. The anterior horns are distorted and flattened, but show about the normal number of nerve-cells, which are practically normal. The degeneration of the fibres of the white matter is very marked in the pyramidal tracts. The anterior ground-bundles and the antero-lateral tracts show a diffuse atrophy, but contain more normal fibres than any other part of the cord. There is also a diffuse atrophy of the posterior tracts, most marked toward the posterior fissure, where most of the fibres have disappeared, and slighter atrophy at the part of the columns lying next to the posterior horns. The nerve-roots are normal. The membranes are somewhat thickened.

Sections from the lumbar enlargement show a cavity in the left posterior horn, quite large at the base of the horn and running down as a narrow slit three-fourths of the distance to the tip of the horn. This horn shows a marked absence of the normal nerve-fibres in the gray matter itself and of those passing out into the posterior columns. The right posterior horn appears normal. The central canal is normal, as are also the anterior horns. The atrophy of nerve-fibres is marked in a band along the border of the anterior part of the cord, broadening out at the lateral part of the cord, so as to include the whole of the pyramidal tracts. The fibres of the anterior and lateral white matter of the cord appear nearly normal. There is a well-marked, diffuse, and fairly uniform atrophy of the fibres of the posterior columns. The nerve-roots appear normal, and the membranes are moderately increased in thickness by an increase of fibrous tissue.

Sections of the upper part of the sacral region of the cord show only a marked atrophy of the lateral pyramidal tracts and a slight, diffuse atrophy of the posterior columns.

Sections at the second cervical segment above the point of greatest dilatation of the cavity in the cord show the large cavity in the centre extending well to either side. At the centre of the anterior border of the cavity the epithelial cells of the central canal are seen. The cord is flattened and distorted. There is a well-marked atrophy of the border of the lateral portions of the cord, beginning near the posterior horns of the gray matter and extending well forward toward the anterior fissure. The posterior columns are markedly degenerated, with the exception of a portion lying next to the posterior horns—probably the posterior root zone—and a portion of the column of Burdach, though on account of the distortion the extent of the normal and degenerated areas cannot be exactly determined. The gray matter of the cord appears practically normal except for its distortion.

A section at the upper part of the pyramidal crossings shows a cavity irregularly quadrilateral in shape, with borders of proliferated neuroglia tissue lying just posterior to the central canal, which is normal. The section shows no atrophy of nerve-tracts, and the gray matter appears normal.

Sections of the medulla at the level of the lower part of the fourth ventricle show some distortion resulting from dilatation of the ventricle. The wall of the ventricle shows an increase of the normal neuroglia. The medulla itself appears normal, except for the distortion.

Anatomical Diagnosis. Hydrocephalus, with dilatation of the lateral ventricles, the fourth ventricle, and the iter; syringomyelia; bronchopneumonia; ulcerations of the ileum; acute lymphatic hyperplasia of the mesenteric lymph-nodes; decubitus.

Summary. There is marked dilatation of the ventricles, including the fourth and the iter, resulting from the hydrocephalus. The branching cavity in the cord seems to originate in the gray matter and not to be a diverticulum of the central canal, although at the point of greatest dilatation of the cavity in the lower cervical region the central canal opens into and becomes a part of the general cavity. The absence of dilatation of the central canal above the point of communication with the cavity precludes the supposition that the latter was produced at this point by the increased pressure. Above the point of greatest dilatation of the cavity there is an ascending degeneration of the direct cerebellar

PLATE II.

FIG. 1.

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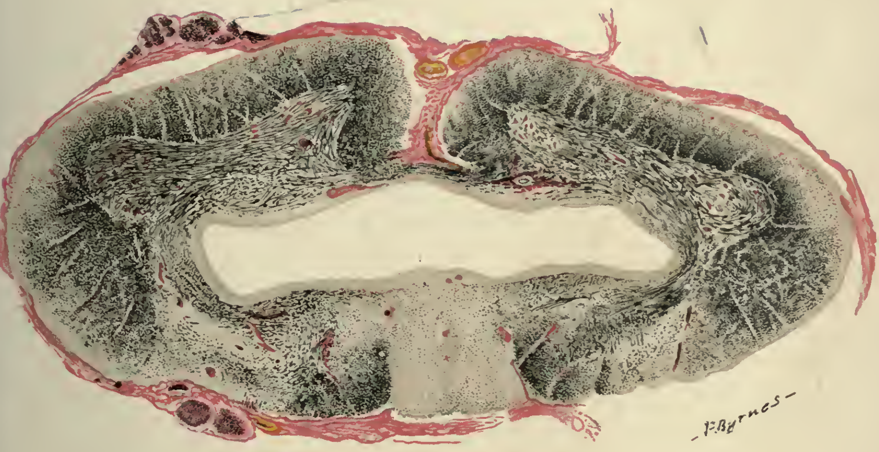
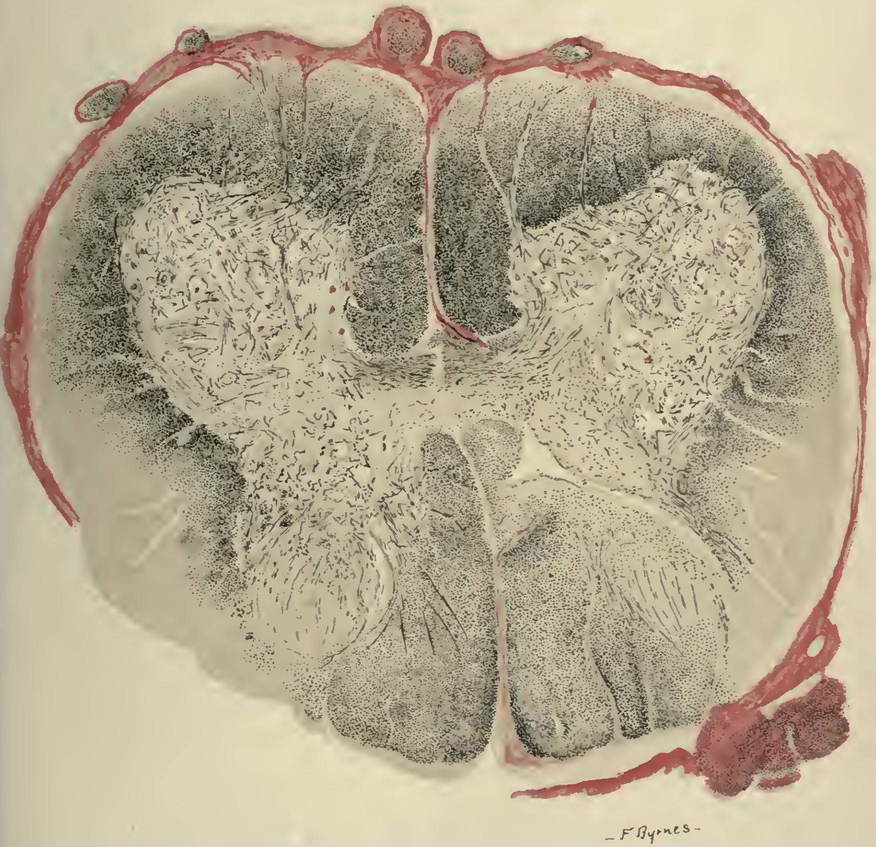


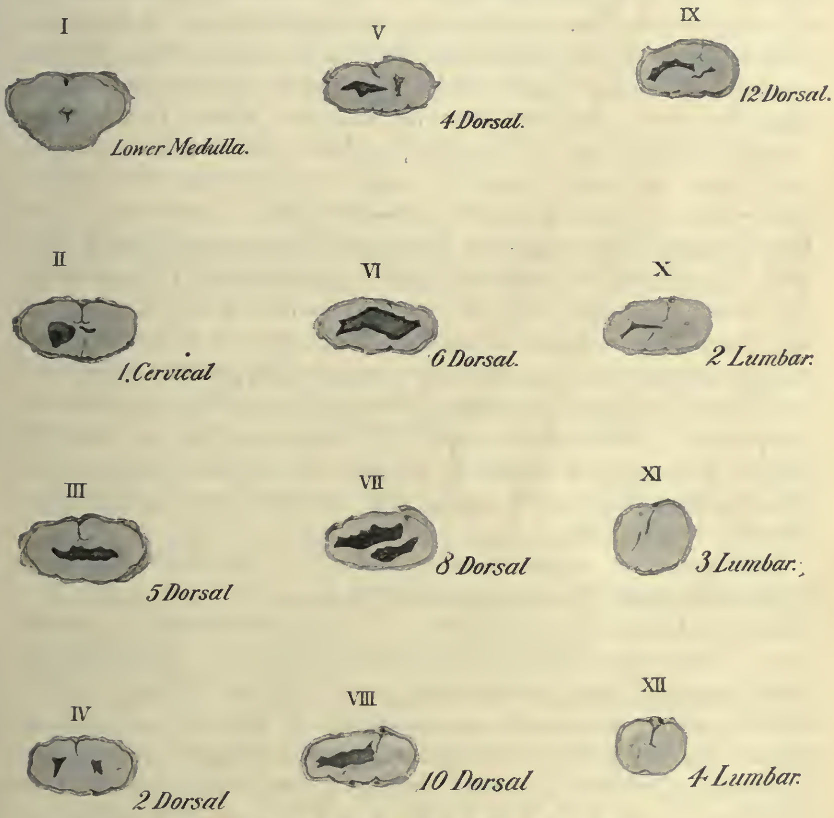
Section from Level of Sixth Cervical Segment.

FIG. 2.



Section from Level of Third Lumbar Segment.

tract, the tract of Gowers, and the posterior columns. Below this point there is a marked degeneration of the direct and crossed pyramidal tracts and a diffuse atrophy of the posterior columns, less marked than in the upper cervical region, undoubtedly caused by the presence of the cavities in the posterior horns. There is also a well-marked atrophy of the tract of Gowers. At the point of greatest dilatation of the cavity there is an extensive degeneration of all the fibres of the white matter of the cord and marked distortion of the gray matter, in which, however, fairly normal nerve-cells are found in moderate numbers. There is a diffuse increase of neuroglia fibres in the atrophied tracts and a marked neuroglia proliferation about the cavity in the cord.



Sections of cord at various levels. Natural size.

RÉSUMÉ. A boy previously healthy and of fairly healthy antecedents becomes, when three years old, subject to attacks of headache of much severity, lasting an hour or more. These are soon accompanied by vomiting, and tend to increase in frequency and severity. This condition continues three years, growing gradually worse, and at the end of that time staggering is noticed, and a severe double optic neuritis appears, which soon produces double optic atrophy and nearly total blindness. The headaches, vomiting attacks, and blindness now continue much the same for nearly two years—the remainder of the patient's life. At times the pain and prostration are such that he stays in bed for days or weeks at a time, then improves and is able to be up and about like a healthy child. There is during this time a great increase in the general adipose tissue, so that the patient becomes obese, and to this condition are later added exophthalmos and an appearance suggesting myxœdema. These two latter symptoms, however, disappear after a month or two. During the first part of this time (in March, 1895) there were apparently some temporary pareses of certain eye-muscles—both external recti—and nystagmus, which later were not found. There were no further changes in the symptoms until, about ten months after the blindness began, there was a sudden attack of paraplegia. This paraplegia remained permanently, and the lower extremities were drawn up and held flexed. Incontinence of urine and feces came on at the same time, and was permanent. At the same time there appeared a paralysis of the left face and some weakness of the upper extremities, but these soon disappeared. Bed-sores developed, but later improved, and the child was in good general condition, although the obesity had somewhat diminished at the time of death. This occurred from an intercurrent affection—typhoid fever.

This case is of interest because, clinically, it presented none of the typical symptoms of syringomyelia. There was no early paralysis or weakness of the limbs. There was no atrophy or other trophic disturbance. There was no apparent anomaly of sensation. We cannot positively state that there was no anomaly of sensation at any time preceding the paraplegia, when there was anæsthesia as high as the second rib around the trunk, but no abnormal change in sensation was found on examination in 1895, and later nothing in this regard was noted, the symptoms being of such a character that no special attention was directed to this point. There were none of the evidences of altered sensation sometimes found in cases of syringomyelia, such as insensibility to wounds or burns. There were no typical changes of the ordinary character found in this affection. There was no scoliosis.

On the other hand, we found a series of symptoms totally unrelated to those of typical syringomyelia. They were supposed at the time to be due to a chronic hydrocephalus, and undoubtedly were so.

Later came the paraplegia of sudden onset, with paralysis of the sphincters and anæsthesia of the trunk and limbs below a given level. While such symptoms are known to occur in syringomyelia, possibly in consequence of an acute breaking down of tissue from hemorrhage or other cause, they are by no means characteristic of this disease.

The occurrence of syringomyelia in company with hydrocephalus has been noted not rarely. Hinsdale says fifteen cases out of one hundred and fifty presented this association.

It may be advisable in the future to distinguish a hydrocephalic type of syringomyelia in which the hydrocephalic symptoms are the only prominent ones in the early and middle stages.

In cases of chronic hydrocephalus of unknown origin in young children the existence of syringomyelia with the hydrocephalus should not be overlooked.

CHOLECYSTITIS COMPLICATING TYPHOID FEVER; TAPPING OF GALL-BLADDER; CHOLECYSTOTOMY; DEATH.

By C. N. B. Camac, M.D.,

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Of late a good deal has been written about the association of cholecystitis with typhoid fever. The following case has occurred recently in Professor Osler's service at Johns Hopkins Hospital:

K. T., colored girl, aged twenty-four years, single, admitted to the hospital on September 15, 1897, complaining of "feeling sick" and out of breath. The following notes were recorded:

Family History. Negative.

Past History. Patient had measles, whooping-cough, scarlet fever, chicken-pox, mumps, and diphtheria. Patient is rather indefinite about malaria and typhoid fever; the latter she thinks she had between the age of nine and ten. Past history otherwise negative.

Present History. Three weeks ago she had a headache and a chill; was out of breath on the least exertion. Following the chill there were vomiting and epistaxis. She has had a chill every day, and sometimes twice a day, since the onset. The chill was usually in the morning. Since the onset the shortness of breath has been a marked feature. She has had occasional pains in the pit of the stomach, but these seem to have disappeared in the last few days. Slight cough, with a sticky, blood-tinged expectoration, began yesterday. Last night, after drinking some milk, she vomited immediately. In the last two weeks thinks that she has vomited about a dozen times.

We therefore have a condition of three weeks' duration; onset with headache, epistaxis, and vomiting. Shortly after the onset a chill, occasional abdominal pain, and at the last a slight expectoration.

On admission, at 6 P.M. on the 15th, the temperature was 102.8°. The following is the note made by Dr. Pancoast: Patient on her back, expression anxious, respiration 40 to the minute. Respiratory movements both abdominal and thoracic. The examination of the lungs, beyond a few fine crepitant râles heard over both fronts, was quite negative, as was also the heart.

The abdomen natural looking, not tender; distinct respiratory movements; spleen not palpable. Examination of sputum showed no tubercle bacilli, numerous cocci.

On the 16th, the day after admission, note by Dr. Osler is: Temperature 104°; pulse 112, small; respirations 40. There seems to be a little pleural rub over the right back. *Abdomen not distended, not tender, no tension* Patient had to-day thirteen stools, of an intense green color, watery, composed chiefly of flakes of mucus; no pus, *no amœbæ* seen. Each stool was about five ounces. There was no griping.

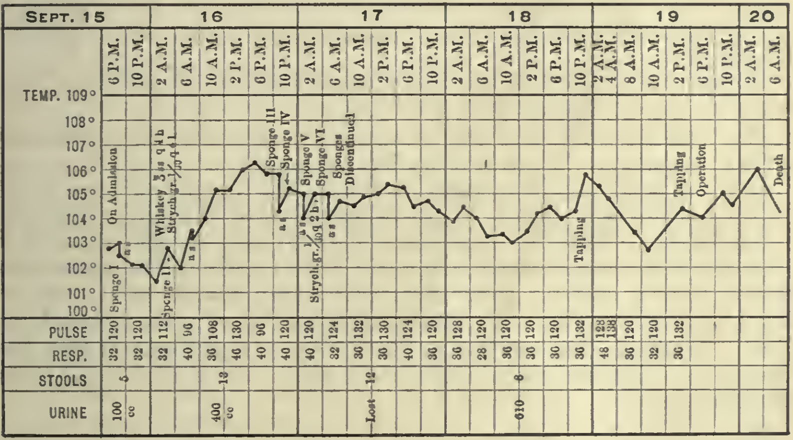
On the 17th the note was: Patient quite rational; respirations not labored, fairly deep. Pulse of good volume, 32 to the quarter minute, not dicrotic; lungs clear, no tubular breathing. Abdomen looks natural; spleen not palpable; *no tenderness;* no gurgling. Leucocytes 6300. Patient feels fairly comfortable; *has no pain;* is hungry. The diarrhœa continues to-day; stools of much the same character as yesterday.

September 19th (note by Dr. Pancoast): The sclera appear to be a little yellow. On placing the hand on the patient's abdomen tenderness on pressure was noticed for the first time, and further examination showed that the right upper quadrant of the abdomen was particularly sensitive. No sensitiveness in right inguinal and iliac regions. In the right upper quadrant there was a definite resistance, and a distinct mass was felt. Abdomen everywhere tympanitic, except in the right upper quadrant, where on gentle percussion the note was dull.

Dr. Pancoast reported this condition at once, and the patient was seen by Dr. Cushing and myself. The right hypochondrium was found to be exquisitely sensitive. The patient was in a moderate sweat, and on palpation, about 9 cm. below the costal margin and about 3 cm. from the umbilicus, there was to be felt a rounded, fairly resistant mass. In view of the fact that the patient had had profuse diarrhœa, the thought of amœbic abscess was entertained. The Widal reaction, however (taken by Dr. Block), was well marked at a dilution of 1 to 70. The continued fever, the gradual onset, typically typhoidal, and the occasional association of cholecystitis with typhoid led us to suspect a distended gall-bladder. The advisability of an operation was considered, and in order to ascertain definitely what the nature of this tumor might be we decided to make an exploratory puncture. About 10.30 P.M. on September 19th I inserted a long hypodermic needle directly into the tumor mass and drew off about 15 c.c. of a clear, urine-like fluid. Our object was merely to make the diagnosis with a view to operation. The needle was therefore withdrawn. I regret exceedingly, however, that several ounces of the fluid were not drawn off. The examination of the cover-slips showed numerous actively motile rod-shaped bacilli, several in chains, extending across the field. The picture was very suggestive of typhoid bacilli. Cultures were immediately made by Dr. Block. Inasmuch as there was no evidence of a purulent cholecystitis, Dr. Cushing advised deferring the operation in the hope that the condition might clear up spontaneously.

Directly after the aspiration the patient was very much more comfortable, turned on her side, and slept for two hours. Later, however, the distress returned. I saw Dr. Cushing again, and it was decided that we should operate at our first opportunity.

I saw the patient again with Dr. Pancoast on the morning of September 20th. Her condition was very bad for operation. There was still great tenderness in the right hypochondrium, and she was apparently suffering. So striking was the relief after aspiration in Mason's case, of which I shall speak later, that I was tempted to make a second puncture, with the hope of drawing off more of the fluid and thus preventing rupture, which seemed imminent; also removing the necessity of operating. The tumor mass, however, was not to be felt. I inserted the needle at the same point as the former puncture, but there was obtained only a small amount of blood. After consultation with Dr. Cushing, it was decided to operate immediately.



Report of Dr. Cushing's operation: Linear incision 10 cm. from the site of the gall-bladder tumor. The edge of the liver extended 5 cm. below the costal margin. A small bleeding point on its surface, about 2 cm. from the edge. A little blood and fluid in fossa, made by liver, duodenum, etc. Cover-slips showed rod shaped bacilli and polynuclear leucocytes. The gall-bladder greatly distended, very tense. The surface had a dark, dull green color; bloodvessels on the surface injected; *a few fine, fibrous shreds on the surface over the lappet of liver;* 120 c.c. of fluid were aspirated after the gall-bladder had been loosely attached to the abdominal wound. The fluid aspirated corresponded exactly with that drawn off last night. On opening the gall-bladder there was found to be no necrotic area. A drainage-tube was inserted and the wound partially closed and packed with gauze. The patient was returned to the ward, and did fairly well until midnight, when vomiting took place. She gradually sank and died early on the following morning.

Autopsy (Dr. Livingood). Conjunctivæ jaundiced. Parietal layer of peritoneum smooth and glistening, nowhere adherent. Vessels are deeply congested. Visceral peritoneum smooth and glistening; fluid covering the surface somewhat viscid, uniformly icteroid. Delicate fibrous adhesions between the upper surface of the left lobe of the liver and the diaphragm. The gall-bladder contains some clotted blood, no gallstones, no evidence of obstruction; mucous membrane not ulcerated. The spleen weighs 340 grammes, is large, regular in shape, of a deep maroon color—a typical typhoid spleen. The liver excepting the thin layer of fibrin noted above is quite normal.

Intestines. Duodenum bile stained, mucous membrane normal; upper portion of jejunum normal. The first Peyer's patch involved was about the middle of ileum; it is small and slightly congested about the edge. From this point on the patches are more elevated and congested, becoming gradually more deeply congested, and show the beginning of ulceration. In the colon there are many minute ulcers with congested margins, the largest ulcer measuring 1 cm. in diameter.

The greatest interest of this case centres about the bacteriological examination. The following cultures and examinations were made:

The aspirated fluid from the exploratory puncture. Examined by Dr. Block

The fluid removed from the gall-bladder at operation and from peritoneal surface. Examined by Dr. Young.

The fluid from the gall-bladder at autopsy and from the peritoneal surface at autopsy. Examined by Dr. Livingood.

Cultures from the bile, made by Block and Young on agar, milk, potato, glucose-agar, bouillon, and gelatin, showed the typical typhoid characteristics. Cultures were also made by Young on agar slant from a sponge which was inserted deep in the iliac region in the abdominal cavity. These cultures gave the same characteristics as the above. Dr. Livingood obtained the same results, and in addition obtained the Malvoz reaction—that reaction in which there is agglutination upon the association of typhoid bacilli with formic acid. These bacilli, and these alone, agglutinate with formic acid.

The following is a report of the bacteriological findings, kindly given by Dr. H. H. Young:

Cover-slips from fluid aspirated from gall-bladder showed bacilli like typhoid. Two Petri dish agar cultures made from fluid aspirated at operation. Eighteen hours later abundant but well-isolated colonies, opaque, gray, moist; microscopically, bacilli like typhoid; all colonies of same character. Agar slant made form a single colony, confluent, grayish-white, moist, semi-translucent; bacilli very motile.

From this:

Milk: slightly acidified after many days, not coagulated.

Potato: meagre, thin, white growth.

Glucose-agar: no gas formation after many days; abundant growth.

Bouillon: clouded.

Hanging drop: very motile bacilli.

Gelatin: no liquefaction; finely granular yellow growth.

Diagnosis: Bacillus typhosus, pure.

Culture on agar slant made from sponge which was inserted deep into the iliac region of abdominal cavity gave well-isolated colonies similar to those from the gall-bladder; these gave the same growth and reaction as above; the bacilli very motile.

Diagnosis: Bacillus typhosus.

I find the literature on this subject very fully treated of in Dr. Osler's "Hepatic Complications in Typhoid Fever," and also in Mason's "Gall-bladder Infections in Typhoid Fever," published in the *Transactions of the Association of American Physicians* for 1897.

HISTORY. Louis, in 1836, appears to have been the first to call attention to this association of cholecystitis with typhoid fever. Andral and Grissolle also make mention of the same association. Rokitansky (*Pathological Anatomy*, p. 160) makes the following statement: "We have noticed the occurrence of the secondary and gangrenous typhoid process on the mucous membrane of the gall-bladder." A case was reported by Ayres in 1846 (*New York Journal of Medicine*) in which perforation of the gall-bladder occurred in continued fever.

Although a number of cases have been reported, it is only since accurate bacteriological examinations have been made that the typhoid bacillus has been shown to be the active agent in exciting the cholecystitis.

In 1896 Gilbert and Girode reported a case of purulent cholecystitis associated with typhoid fever. From the pus from the gall-bladder pure cultures of typhoid bacilli were obtained. This was five months after the fever. Dupré appears to have been the first to obtain the bacillus during the progress of the fever. His first case, reported in 1891, died on the sixteenth day. His second patient died six months after the fever, following an operation for gallstones. Guarnieri also reports (1892) the finding of the bacillus in the contents of the gall-bladder. Chiari's and Flexner's reports are perhaps the most valuable. The former found the bacillus in twenty out of twenty-three cases; the latter in seven out of fourteen cases. We have collected forty cases in which a bacteriological examination has been made, in thirty-four of which typhoid bacilli were found.

METHOD OF INFECTION. It becomes a question of immediate interest as to how these bacilli reach the bile passages. There are four channels: 1. Through the intestinal wall. 2. Directly from duodenum through bile passages. 3. Through the liver. 4. Through the portal system. Satisfactory experimental evidence is lacking to prove conclusively any one of these to be the invariable path of infection.

The normal bile is sterile. If there be any obstruction to the outflow of bile, organisms rapidly develop within the gall-bladder. Within twenty-four hours after ligation of the common duct, as shown by Charcot and Gombault, the bile contains numerous organisms. Sherrington has shown that only when the blood is contaminated by the poisonous products of bacteria could they pass through the hepatic tissue. These experiments suggest the possibility of two sources of infection: from the duodenum, producing inflammation of the ducts and obstruction of the bile, rendering the gall-bladder a suitable place for the development of pathogenic organisms; through the liver from the blood, the hepatic tissues having been lowered in their resistance by the poisonous products of the typhoid bacillus. This latter will be borne out by the fact that in none of the cases reported in our table has this condition been detected earlier than the twelfth day. The presence of typhoid bacilli in the gall-bladder ten to twelve days after intravenous inoculation, as done by Blackstein, would again bear out the experiments of Sherrington. We may therefore conclude, from experimental as well as from clinical evidence, that the source of infection is twofold: from duodenum through bile passages; from blood through hepatic tissues.

Chiari's suggestion that the typhoid bacillus makes a habitat of the gall-bladder is an interesting one, inasmuch as an increased flow of bile which follows active feeding may account for a relapse. The rationale of a careful diet may here be seen. It is a common experience that a return to full diet may be followed by a slight rise of temperature or even by a definite relapse.

SYMPTOMS. A study of the collected cases brings out several valuable facts. The age would of course correspond with that at which individuals are most frequently attacked by typhoid—*i. e.*, twenty to thirty.

Of more interest is the day of disease. From the tenth to the thirtieth day is by far the most frequent period, and of these the twenty-first to the thirtieth has the majority; eight of these cases occurred on the twenty-first and one on the twentieth.

The symptoms present no regularity. Pain would appear to be the most constant. Out of twenty-five, of which we have full notes, nineteen had pain at the onset. The significance of Holscher's twenty-two jaundiced cases out of 2000 autopsies cannot be appreciated here, because further particulars as to pain, tumor, etc., are not noted. His statistics, however, go to show the uncertainty of this sign.

Until a systematic examination of the gall-bladder and its contents becomes a part of every autopsy on typhoid fever cases it will be impossible to state how frequently this complication is latent. The rapid development and usually fatal termination make cholecystitis a most serious complication, and therefore the subject of treatment becomes one of immediate importance.

TREATMENT. Of twenty-eight cases the gall-bladder had perforated in twenty-one. These figures show that some form of active treatment is advisable. We have to select from the following: 1. Counter-irritation. 2. Cholecystotomy. 3. Aspiration.

The first is obviously too mild a measure for so serious a condition. If, however, pain only is complained of, active counter-irritation might avert further development.

The real question, however, is between aspiration and laparotomy. Of the three cases in which aspiration was resorted to—those of Pepper (Sr.) and Mason and the present case—Mason's was the only one to recover. The details of Pepper's case are not sufficient for us to draw any conclusions. From Mason's report it would appear that this was the one measure to have adopted. The patient's condition was apparently too severe for operation, and yet the simple procedure of drawing off three or four ounces of fluid seemed so much preferable that one more than hopes that this would be sufficient. The fact, however, that in our case typhoid bacilli were obtained both by Young and Livingood from the peritoneum would lead one to suspect leakage of the bile, with the undoubted result of a general peritonitis. It is well known that gynecologists have abandoned aspirating ovarian cysts on account of this danger of leakage and general peritonitis. Moreover, in our second puncture we wounded the liver, thus allowing of slight oozing of blood—slight as it was, yet sufficient to produce a thin film of inflammatory exudate on the liver. Considering the rich medium which blood offers for the culture of pathogenic organisms in the abdominal cavity, are we not running a double risk in taking the chances of wounding a viscus? The showings, however, of the results after operation are perhaps as gloomy. Aspiration would seem justifiable only as a means of diagnosis when the purpose is to operate immediately.

The complication occurring at the height of the disease, when the patient is in the worst possible condition for operation, is a serious consideration. If, however, there is any chance of averting what from the table appears to be inevitable, is it not through prompt operation? And are we not increasing the dangers by attempting to aspirate the gall-bladder?

From the foregoing we may then say that acute cholecystitis is a grave complication of typhoid fever, occurring most frequently in the third week, due, in all probability, to an infection of the bile passages, by the typhoid bacillus producing an obstruction to outflow of bile, thus rendering the bile a favorable medium for the growth of the typhoid bacilli, another source of infection being through the hepatic tissues from the blood; the most constant symptoms being pain and tumor in the right hypochondrium. Treatment, prompt operation on development of tumor.

Observer.	No. of cases.	Age	Symptoms	Day of disease.	Treatment.	Result.	Remarks.
Louis (1836)	...	...	....	...	....	......	Not included in summary.
Ayres (1846)	1	adt	Acute pain in right hypochondrium.	Conval. 21st	....	Death	Perforation of gall-bladder; no gallstones.
Budd (1857)	1	18	Pain in region of liver; great tenderness; palpable tumor; no jaundice	21st	....	Death	Distended gall-bladder; purulent cholecystitis; 14 gallstones; extensive
Pepper (Elder) 1857	1	...	See list of tapped cases.	...	Tapping	Death	Ulceration Peyer's patches.
Von Hoffman (1869)	1	25	Jaundice.	42d	....	Death	Perforation of gall-bladder; no gallstones; typical intestinal lesions.
Burger	1	41	Pain and tumor in region of gall-bladder; chill; no jaundice.	12th	....	Death	Perforation of gall-bladder; no gallstones.
Legendre	1	30	....	14th	....	Death	Perforation of gall-bladder; three gallstones.
Murchison	1	yth	Severe abdominal pain.	15th	....	Death	Perforation of gall-bladder.
Frierichs	1	26	Painful pear-shaped tumor in right hypochondrium; vomiting.	13th	Leeches and counter-irritation	Recovery.	Gall-bladder continued to be palpable late into convalescence.
Lavaran	1	23	Painful tumor in region of gall-bladder.	42d	....	Recovery.	
Martin-Solon	1	?	General abdominal pain.	?	....	Death	Numerous ulcerat'ns of gall-bladder. (Typhoid fever?)
Husson	1	8	....	21st	....	Death	Perforation of gall-bladder.
Dumoulin	1	19	Tumor in right hypochondrim; vomiting; chills.	21st	....	Death	Gall-bladder contains 2 litres of greenish bile; no gallstones; typical intestinal lesions.
Archambault	1	inf	....	30th	....	Death	Perforation of gall-bladder; localized peritonitis.
Barthez and Rilliet	1	12	Tumor in right hypochondrium; disappeared before death.	16th	....	Death	Perforation of gall-bladder; circumscribed pus cavity.
Ranvier	1	28	....	35th	....	Death	Perforation of gall-bladder; small stone; localized peritonitis; Peyer's patches cicatrizing.
Colin	1	adt	Jaundice.	21st	....	Death	Perforation of gall-bladder; no gallstones (typh. intest. lesions).
Foote	1	32	....	56th	....	Death?	Abscess of gall-bladder; small stone.
Williams and Shields	1	31	Peritonitis and perforation.	42d	Operat'n (laparotomy).	Recovery.	Perforating ulcer of gall-bladder; no gallstones.
Stedman (1882)	3	13	Peritonitis.	24th	....	Death	" " "
		6	....	20th	....	Death	1½ pints of yellowish serum.
		16	Tender rounded tumor in region of gall-bladder.	14th	....	Recovery.	Perforation of gall-bladder; extensive ulceration of inner surface.
Griesinger	1	20	Painful tumor to right of umbilicus; disappearance; reappearance of tumor in 8th week, and twice subsequently; no jaundice.	42d 56th	....	Recovery.	
Laudet	1	36	Tumor in right hypochondrium, lasting ten days; reappearing at intervals for seven weeks; no jaundice.	28th	....	Recovery.	

Observer.	No. of cases.	Age	Symptoms.	Day of disease.	Treatment.	Result.	Remarks.
Flexner (1896)	14	...	No hepatic complications detected during life.	...	......	D.	Typhoid bac. found in 7; no ulceration of gall-bladder (7 out of 14).—*Flexner.*
Chiari 1893–94)	23	12	....	42d	......	D.	Purulent cholecystitis; typh. bac. in pus from gall-bladder.
		...	....	...	......	D.	No typh. bact. found,
		...	....	...	......	D.	Typh. bac. found (19 out of 23).—*Chiari.*
Alexieef (1896)	1	...	Pain in right hypochondrium; pear-shaped tum. at rt. cost. cart.; 2 days later abd. very tender and dist.; no jaundice; typhoid.	21st	Operation packing and draining.	R. with slight relapse.	Purulent cholecystitis; contents of gall-bladder contained bacteria typhoid.
Curvoisier (1890)	14	...	Typhoidal.	...	......	D.	10 cholecystitis; 4 perforations of gall-bladder.
Hölscher (1891)	28	...	2000 autop. typhoid fever; 22 jaundice.	...	......	D.	22 jaundice; 5 purulent cholecystistis; 1 perforation of gall-bladder; balance hepatic degeneration.
Dupré (1891)	2	46	....	16th	......	D.	Pure cultures of typhoid bac. from gall-bladder during fever.—*Dupré.*
		45	....	6 mo. after fever.	Oper. for gallstones.	D.	Pure cultures of typhoid bac. from gall-bladder 6 months after fever.—*Dupré.*
Chantemesse	1	...	....	8 mo. after fever.	......	R.	Not included in summary.
Anderson (1897)	1	67	Intense pain in rt. hypochondrium; swelling at 9th costal cartilage; liver abscess suspected.	3 mo. after fever.	......	D. 11 dys after onset of pain.	General peritonitis; acute cholecystitis; ulceration and perforation of gall-bladder; doubtful as to whether bac. found in gall-bladder were bac. typhosis or coli com.
Osler. (1897)	3	24	Jaundice, fever, pain in right side; double parotitis; Widal's reaction marked.	1 yr. and 3 mo after fever.	......	R.	
		29	Frequent attacks of pain in rt. hypochondrium, each attack being more severe, and finally demanding oper.	8 mo. after fever.	Operation.	R.	Purulent cholecystitis.
		37	Pain in epigastrium extending to rt. side; jaundice; no chill: considerable vomiting.	2 mo. after fever.	Operation.	D.	Ruptured gall-bladder: purulent material from gall-bladder contained only bac. coli com. (typhoid fever?).
Dungern (1897)	1	46	Recurring attacks of swelling (and pain?) in region of gall-bladder for fourteen years.	5 yr. after fever.	Operation.	?	Typhoid bac. in fluid from gall-bladder (injected into animals produced typical lesions); no gallstones; 150 c.c. of brownish-yellow pus evacuated from abscess appearing to connect with gall-bladder: pus bile stained.
Cushing, (1897) published (1898)	1	26	No history of typhoid fever. Widal's reaction positive.	...	Operation.	...	Fluid obtained from gall-bladder contained bac. resembling bac. typh., giving all bacteriological reactions of bac. typh. (Malvoz test not tried).
Gilbert and Girode (1890–93)	1	45	Pain and swelling in right hypochondrium.	5 mo. after fever.	Operation.	D.	Purulent cholecystitis; small stone; cultures of bac. typh. in material from gall-bladder.
Francis Hawkins (1897)	1	18	Pain right epigastrium and hypochondrium; jaundice: bile in urine; jaundice persisting three weeks.	...	......	D.	Purulent cholecystitis; one gallstone; typical typhoid lesion.

Cases in which Tapping was Resorted to.

Observer.	No. of cases.	Age	Symptoms.	Day of disease-	Treatment.	Result.	Remarks.
Pepper (Elder), (1857)	1	26	Severe pain and tumor in right hypochondrium.	6 mo. after supposed typh. fever.	Tap'ng, ℥iv withdrawn (for remedial purposes).	D.	4 oz. muco-purulent material withdrawn. *Autopsy:* Distended gall-bladder; 2 qts. semi-purulent fluid; ulceration on inner surface; no stones.
Mason (1896)	1	30	Severe abd. pain, max. intensity in right hypochondrium; tumor in right hypochondrium visible and palpable, 4 cm. in diameter; dull on percussion; descends on full inspiration; condition wholly absent a week before.	21st	Tap'ng, ℥iijs withdrawn (for remedial purposes).	R.	Oper considered; patient's condition did not admit of it; tapping resorted to in preference, 3½ oz. fluid withdrawn. *Examination fluid withdrawn:* Pus cells; numerous short, thick bac. w. rounded ends; cultures on potato, milk, sugar, gelatin, and agar showed typical bac. typh. These bacilli agglutinated with serum from cases of known typhoid, also w. pts. serum. Control agglutination tests with serum from p'ts suffering from malaria, pneumonia, phthisis, and rheumatic fever, negative.
Present case (1897)	1	24	Painful rounded tumor in right hypochondrium. not visible; slight yellowing of conjunctiva (colored girl) sudden development. Widal's reaction given, dilution 1–70.	21st	Tap'ng, ℥iv withdrawn (for diagnostic purposes).	D.	*Tapping:* Fluid contains no leucocytes; clear straw-colored fluid; short bac. rounded ends; motile; bacteriol. reaction typical bac. typh. *Operation:* Distended gall-bladder; puncture edge of liver; bleeding surface; thin inflam. layer over punct.; gall-bladder aspirated; several ounces withdrawn; aspirated fluid identical microscopically and bacteriologically to that withdrawn on tapping. *Autopsy:* Typical typhoid spleen and lesions in intestines: inner surface of gall-bladder hemorrhagic—otherwise condition similar to operation note. Bacteriological examination: bac. typh. obtained from gall-bladder and peritoneum (Malvoz reaction given). Three independent observers with similar results.

SUMMARY.

Clinical operation and autopsy reports in	43
Autopsy reports only in	72
Total	115
Bacteriological examination in	40
Contained bacillus typhosus	34

Age.

Infant	1
Between 1–10 years (inclusive)	3
" 11–20 " "	8
" 21–30 " "	11
" 31–40 " "	4
" 41–50 " "	5
" 51–60 " "	0
" 61–70 " "	1
No age given	82
Total	115

Day of Disease.

10th to 30th (inclusive)	19
31st to 50th "	6
51st to 70th "	2
2 to 3 months "	1
4 to 6 " "	1
6 to 9 " "	2
1 year or more	2
No day given	82
Total	115

Symptoms.

Pain only, general	4
" " local (3 of which had jaundice)	4
Tumor only	6
Pain and tumor	11
Jaundice only (22 of Hölscher's cases)	24
No symptoms (infant)	1
" "	8
See table: Flexner	14
See table: Chiari	23
See table: Curvoisier	14
See table: Hölscher	6
Total	115

Pathological Features.

Distended gall-bladder:	
10th to 20th day (inclusive)	1
21st to 30th " "	4
31st to 40th " "	0
41st to 50th " "	1
6 months	1
Perforation of gall-bladder:	
10th to 20th day (inclusive)	5
21st to 30th " "	5
31st to 40th " "	1
41st to 50th " "	2
51st to 60th " "	1
Time not given	5
3 months	1
2 "	1
Stones	4
Purulent cholecystitis only	9
Ulceration	2
Unclassified	72
Total	115

Treatment.

Non-interference:	
Recovery	5
Death	64
Operation:	
Recovery	3
Death	3
Counter-irritation:	
Recovery	1
Death	
Tapping:	
Recovery	1
Death	2
Not included, see table: Chiari	22
Not included, see table: Flexner	14
Total	115

A CLINICAL STUDY OF DUPUYTREN'S CONTRACTION OF THE PALMAR AND DIGITAL FASCIA.

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While the affection known as Dupuytren's finger contraction was not previously entirely unknown, its pathological anatomy and essential nature were first demonstrated by the dissections and operations of G. Dupuytren, from whom it received its eponymous designation. His original deliverance on the subject was given in a clinical lecture, December 5, 1831.[1] Since that time numerous studies of the disease have been made, an extensive literature produced, and several hundred cases put on record.

The study here presented is based on fifty cases of contracted fascia observed among inmates of the United States Soldiers' Home, Washington, D. C. These cases embrace all grades of severity, from slight thickenings of the fascia in the palms, without limitation of the extensibility of the fingers, to extreme and deforming finger contractions.

A knowledge of the anatomy of the fascia of the normal palm is necessary to an adequate understanding of the pathology and mechanism of Dupuytren's contraction. In the American edition of Gray's *Anatomy* a full description of the normal palmar fascia, from original observations, is given by W. W. Keen, who is one of the principal American authorities and investigators on the subject of the affection under consideration. In brief, the palmar fascia, or aponeurosis, consists of a fan-shaped expansion of firm fibrous tissue radiating from the depression between the thenar and hypothenar eminences (the interthenar depression, it may be called), where it arises from the annular ligament and the tendon of the palmaris longus muscle, over the metacarpus. The palmaris brevis muscle is connected with it on the ulnar side. Opposite the metacarpo-phalangeal articulations there is a well-marked ligamentous band of transverse fibres, the superficial transverse ligament of the palm; at this point many of the longitudinal fibres in the fan-shaped fascia terminate, leaving a few fibres to pass to each of the digits, where they are attached to the skin and fibrous investments of the phalanges. At the web of the fingers is situated another transverse fibrous band, bounding the distal margin of the palm, called the "fibres of Gerdy," or the superficial transverse ligament of the fingers. The fascia is situated immediately underneath the skin of the palm, from which it is separated only by thin masses of fatty tissue; the fascia is intimately connected with the skin by numerous fibrous bands—an important point in the mechanism of Dupuytren's contraction.

Microscopically, the fascia consists of coarse bundles of dense fibrous tissue, which in places are connected with the corium by smaller fibrous bands crossing through the fatty layer which separates the fascia from the cutis. The fibrous fasciculi are arranged longitudinally, and in places transversely also. The fibrous tissue consists mainly of white fibres, numerous among which are exceedingly elongated connective-tissue cells. Penetrating among and running along the fibrous bundles are minute bloodvessels (Fig. 1).

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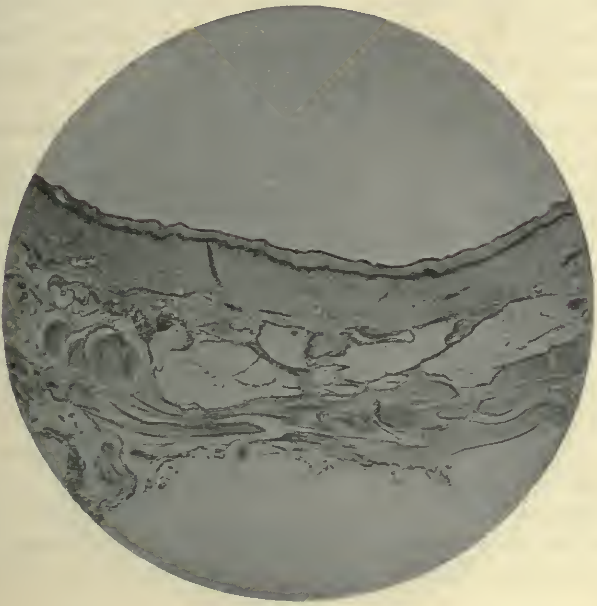
[1] Published in Journal universel et hebdomadaire de médecine et de chirurgie pratiques, Paris, 1831, and elsewhere.

The morbid anatomy and mechanism of the condition known as contraction of the palmar fascia has been settled by a number of post-mortem dissections. It consists essentially of a hypertrophy of limited longitudinal portions or fasciculi of the fascia of the palm and fingers, or a development of new fibres, together with, usually, contraction of the hypertrophied band in a longitudinal direction. The results of this condition are (1) flexions or contractions of the phalanges of the fingers caused by the traction of the shortened bands; and (2) induration and changes in the surface configuration of the skin, caused mostly by traction on the small fibres connecting the fascia with the corium or by the thickened and elevated tissues underneath lifting up the skin.

FIG. 1.



Transverse section of skin and subcutaneous tissues from normal palm, near the metacarpo-phalangeal joint of the ring finger, showing longitudinal and transverse fibrous fasciculi and fibres connecting them with the cutis. Magnified 10 diameters.

Whether the lesion consists of a hypertrophy of pre-existing fibres or is a development of new fibres (a hyperplasia or a neoplasm) has been a point of discussion. The flexor tendons of the fingers, which lie underneath the fascia, are not in the least affected, although the flexion of the fingers strongly suggests a muscular or tendinous pull. Changes in the affected joint have in some cases been reported, due to prolonged malposition and immobilization; involvement of the tendon sheaths has also been reported.

A few microscopical examinations of the lesion have been recorded.

P. Richer[1] found the diseased fascia identical in structure with that of normal palmar fascia, except that the fibrous elements were more compact and more numerous in the contracted band; the aponeurosis alone was altered, there were no evidences of inflammation, and the lesions coincided with those of chronic articular rheumatism.

F. Chevrot[2] reported a thickening of the layer of fascia lying underneath the dermis, so that it formed a dense fibrous or sclerotic tissue not containing any fibroplastic bodies (connective-tissue cells) or elastic fibres; the fatty tissue normally separating the fascia from the corium was absent, so that the dermis merged directly into the hypertrophied fascia; the epidermis was thickened, its superficial cells being less horny, less flattened, and less compacted together than normally, from immobilization and protection of the surface against friction; the dermis was slightly thickened, and the linings of the sweat-glands were apparently thicker than normal.

William Anderson[3] states that the histological appearances are those of fibrous tissue, and that "if the disease is spreading the fibrous strands are intermingled with nuclear proliferation, which extends especially along the course of the vessels." He considers the condition to be an "inflammatory hyperplasia [or neoplastic growth] commencing in the skin and subcutaneous tissue of the palm, involving the fascia secondarily, and replacing the adipose connective tissue." He regards it as due to micro-organisms, but culture-tests and microscopical search gave negative results so far as finding the germ was concerned.

Langhans is quoted[4] as maintaining, as a result of careful microscopical investigation, "that the trouble is due to neoplastic or inflammatory changes, partly in the palmar aponeurosis, partly in the neighboring tissues, including the coats of the arteries and also the capillaries, about which a subendothelial granular adventitia has formed."

I have made a microscopical examination in one case, which was as follows:

Case I.—H. D. J., born in 1828, in Ohio. He was a soldier from 1854 to 1883, and afterward lived on a pension, without working. Aside from nasal catarrh, deafness, and a urethral stricture, his general health was fairly good until the autumn of 1894, when he was attacked with pains in various large and small joints, which gradually became enlarged, together with œdema of the lower extremities. Concurrently with the appearance of this rheumatoid attack a marked contraction of the fascia in the right palm developed, reaching its maximum in the course of about two months.

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[1] Bulletin de la Société Anatomique de Paris, 1877, p. 124; and Progrès médicale, Paris, 1877, vol. v. p. 369.

[2] Recherches sur la rétraction de l'aponévrose palmaire, thesis, Paris, 1882, p. 21.

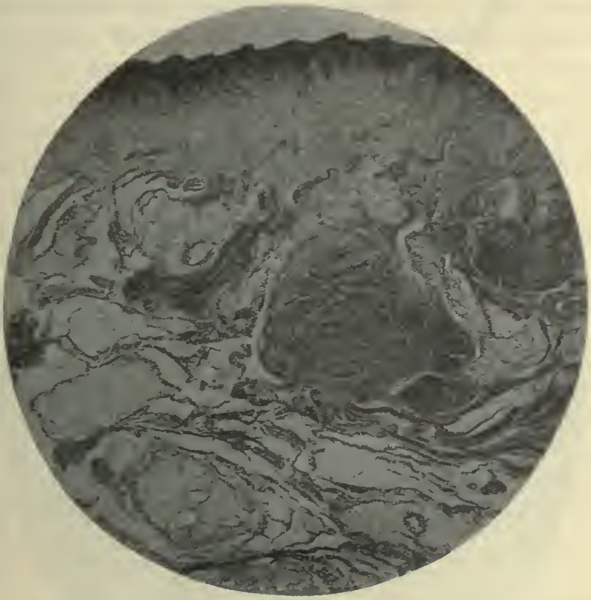
[3] Deformities of the Fingers and Toes, London, 1897.

[4] British Medical Journal, January 10, 1891, p. 62.

When first examined, July 12, 1895, there was marked enlargement of the right knee, the wrists, all the metacarpo-phalangeal joints, and to a less extent of the other phalangeal articulations, causing some arthritic deformity of the fingers; there was also valvular disease of the heart. In the right palm were three bands of contracted fascia from the interthenar space to the little, ring, and middle fingers. The little finger was flexed nearly to the palm and could not be extended beyond a right angle; the ring and middle fingers were similarly contracted, but to a less degree, the middle finger being less affected than the ring finger. The palm, especially on the ulnar side, was nearly doubled on itself, causing a deep, transverse depression which was crossed by the bands of fascia.

There was no further change in the condition of the palm. The patient died of facial erysipelas February 14, 1896.

FIG. 2.

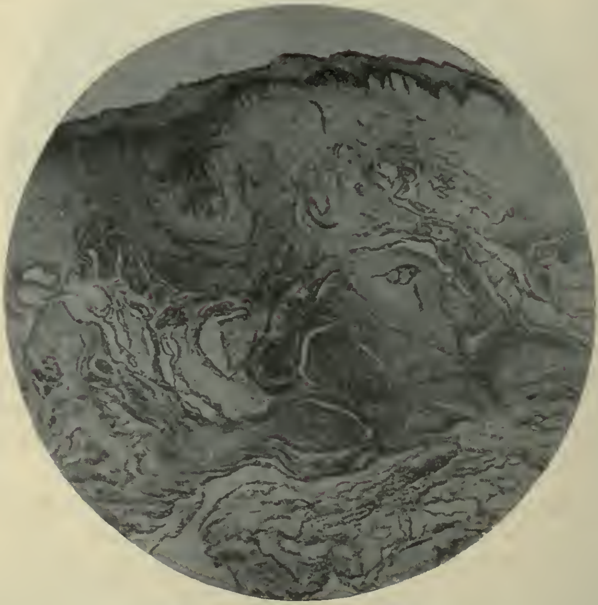


Transverse section of skin and contracted palmar fascia leading to little finger. Magnified 10 diameters.

Microscopical Examination. Transverse and longitudinal sections were made, embracing the contracted band running to the little finger. The skin was thick, but doubtless there is great variation in the thickness of the skin of the palm in different individuals. In most places the fibrous band was in contact with the corium, with no fatty tissue intervening. The epidermis, dermis, and subcutaneous tissue appeared otherwise perfectly normal. The sweat-glands were abundant, but not perceptibly hypertrophied. In the layer of palmar fascia was the contracted band, a large, prominent, longitudinal, rounded bundle of dense fibrous tissue, from 2½ to 3 millimetres in diameter. It consisted of dense, white fibrous fasciculi, among which elongated or linear connective-tissue cells were exceedingly abundant. Some fasciculi, indeed, were composed mainly of cells, as if the fibrous elements were in process of formation. Through it in numerous places ramified slender arterial and capillary tubes, in the adventitia of or surrounding which was an abundance of connective-tissue cells. As compared with a section of normal fascia, the contracted band exhibited a similar structure except as to its hyperplastic or hypertrophied condition, a greater relative number of connective-tissue cells of normal or ordinary type among the fibrous elements, and a greater abundance or proliferation of similar cells in the adventitia or the vicinity of the bloodvessels. The lesion seemed to consist in a hyperplasia or new growth of connective-tissue cells, which then produced an increased amount of fibrous elements (Fig. 2).

At one point, as shown by a series of sections, the skin was infolded in a longitudinal furrow, from traction by a fibrous band underneath; at the end of this furrow the superficial epithelium dipped downward into the corium, and a tip of epidermis projected entirely underneath the cutis vera (Fig. 3). At one place there was a Pacinian corpuscle directly beneath the contracted band, in the adipose tissue.

FIG. 3.



Transverse section of skin and contracted palmar fascia leading to little finger, showing inversion of epithelium. Magnified 10 diameters.

From these observations the lesion seems to consist in a hypertrophy or a hyperplasia or entirely new growth of fibrous tissue in the palmar fascia, affecting especially circumscribed longitudinal tracts; there is usually a longitudinal contraction of the affected tissue, the thickening being especially manifest in the transverse diameters. In recent or developing cases (like Case I.) connective-tissue cells may be abundant in the affected tissue; in cases of longer standing (as Chevrot's may have been, though the duration of the disease is not stated) the fibrous elements may be relatively increased and the cells diminished. The skin may be thickened and indurated, and the fascia may come into juxtaposition with the dermis, from disappearance (probably from pressure) of the adipose tissue ordinarily separating the two.

The cases may in general be divided into three groups: (1) The ordinary well-marked typical cases in which there is contraction of one or more fingers, together with the characteristic manifestations of the disease in the palm. The contraction of the fingers varies in degree from marked deformity and disability to only slight limitation of full extension of the finger. This class, therefore, shades gradually into the following group. (2) Cases in which there is hypertrophy of the palmar fascia and the characteristic thickening, induration, and altered configuration of the skin are present in the palm, but in which the fingers are not contracted. These cases in which the lesions are confined to the palm are usually mild, yet they may amount to considerable deformity and some disability. (3) Cases in which the shortening of the fascia and the contraction are limited entirely to a finger, the palm being unaffected. Of the 50 cases observed, 31 were of the first, 18 of the second, and 1 of the third variety.

The conditions present in the affected palms are very characteristic. The contracted fibrous bands occupy certain definite positions. Arising near or in line with the interthenar depression, they cross the concavity of the palm longitudinally, in taut, straight lines, as a bowstring is stretched across the concavity of the bow. The thickened bands, with the overlying skin, form well-marked ridges and elevations across the palm, very apparent to sight and feeling. From the interthena the bands pass in direct and definite lines to the fingers, not taking the direction of the interspaces between the digits. Even when the lesion is confined to the palm the contraction or induration occupies a characteristic and definite locus with relation to the metacarpus of one or another finger, so that the finger which is affected is plainly manifest. In the fingers the band usually follows the middle of the palmar aspect; but sometimes, especially in the little finger, the band crosses the proximal phalanx obliquely, or lies toward one side. Usually the bands in the palm do not branch, and each finger affected has its band distinct from the others; but in three of the cases a band from the interthena to the little finger opposite the metacarpo-phalangeal junction sent off a branch which contracted the third finger also; and in one case there was a similar branch to the middle finger given off from a band leading to the third finger.

Besides the ridges formed by the contracted fascia bands, there are other characteristic alterations of the normal configuration of the surface of the palm. Minute punctate depressions of the skin, frequently pointing wristward as well as inward, are common, caused by the traction of bands connected with the cutis. Nodules, like callosities, formed by indurations of the skin and fascia, are also of frequent occurrence. The metacarpo-phalangeal articulations (especially of the ring finger) are favorite localities for the presence of these indurations and inversions of the skin, though they occur anywhere over the proximal phalanges. The transverse palmar line that runs from the ulnar side of the palm to the web between the forefinger and middle finger is frequently much deepened by the flexion of the fingers. Tension or stretching of the skin is sometimes produced by the traction.

As to the distal termination of the bands, there is some variation. Many small, shortened fibres are connected with and terminate in the cutis, causing characteristic depressions of the skin. In many of the cases in which the lesion is confined to the palm the bands terminate near the metacarpo-phalangeal joints, expending their force on the skin and subcutaneous tissues at those points instead of drawing on the fingers. Occasionally a thick and well-marked band continues some distance up a finger, yet (not being shortened) without causing any flexion of the phalanges. Many bands terminate by a general blending with the skin or subcutaneous fibrous investments of the finger, usually around the proximal phalanx; many others have a more or less definite and distinct insertion, especially into the proximal end of the middle phalanx.

The contraction of the fingers, which is caused by the traction exerted by the shortened bands, consists in a limitation of extension of the finger; within the limits allowed by the contracting band flexion and extension are unimpeded, but beyond them further extension is impossible. The degree of contraction varies from complete flexion of the finger into and against the palm to only slight limitation to the full extensibility of the finger. The contraction may affect any of the three phalanges. When the traction is exerted on the proximal phalanx the finger is flexed as a whole on the metacarpo-phalangeal joint, the extensibility of the middle and distal phalanges being unaffected. When the traction is on the middle phalanx, this is flexed on the proximal phalanx; and if, as commonly occurs, the band is sufficiently shortened, the proximal phalanx is also flexed on the metacarpus, although the band may not be connected with this phalanx. The insertion of the band into the middle phalanx is demonstrable in many of these cases by the fact that when the proximal phalanx is forced into extreme flexion, thus relaxing the band, the middle phalanx can be completely extended, or extended to an increased degree; and when the middle phalanx is forcibly flexed, thus again relaxing the tension, the proximal phalanx becomes capable of greater extension on the metacarpus. Insertion of the band into the distal phalanx, with flexion thereof, was observed in only two cases. In one case, in which the first two phalanges were strongly bent, the distal phalanx was hyperextended or bent backward by the contracting band, which crossed along the side of the middle phalanx to the back of the distal phalanx. Fingers adjacent to one strongly contracted are frequently also slightly bent from traction of the skin or fibres (of Gerdy) in the web of the fingers.

In only one case out of the fifty was the digital fascia affected alone, without involvement of the palm. In this case a post-mortem dissection demonstrated definitely the character of the lesion, as follows:

CASE II.—J. B., born in 1820, in Ireland. Soldier, 1851–1867; afterward a laborer, and from 1888 inmate of Soldiers' Home. He was subject to chronic rheumatism, and for some years before death was debilitated and demented, from senility, which prevented the ascertainment of a full history. There was a vague history of some injury to the left little finger about 1880. He died March 2, 1897.

At the time of death his left little finger was contracted. The middle phalanx was flexed on the proximal one to an angle of about 135°; it could not be further extended, but there was no obstacle to flexion. The distal phalanx was slightly flexed on the middle one. The proximal phalanx was unaffected. Along the ulnar side of the palmar surface of the finger was plainly palpable a firm, subcutaneous cord, extending from the base of the proximal phalanx to the last phalanx, apparently the cause of the contraction. Aside from a very faint depression of the skin in the palm there were no evidences of any lesions of the fascia or skin of the left palm.

Dissection. The fascia in the left palm was prominent, but not abnormal. Along the ulnar side of the little finger, just anterior to the plane of the bones, the fibrous tissue was hypertrophied and thickened into a firm, well-marked contracting band. This band lay in the dense fibrous investment underneath the skin and surrounding the tendon-sheaths and phalanges. It arose from the outer side of the base of the proximal phalanx, being connected with fibres from the palmar fascia, with the ligaments and fasciæ about the metacarpo-phalangeal joint, with the common tendinous insertion of the abductor minimi digiti and flexor brevis minimi digiti, and with the fibres of Gerdy, which enveloped the attachments of the band externally. The band passed along the finger in the same relative position, being at all points closely connected with the fibrous investments, and terminated in the antero-external portion of the distal phalanx. The shortness of this band caused the contraction of the phalanges. There was no inversion, depression, induration, or traction of the skin, and no old cicatrices were present.

Such a case as this departs in several characteristics from typical Dupuytren's contraction. It is, however, a distinct contraction of the subcutaneous digital fascia, quite analogous to the much commoner contraction having its seat in the corresponding palmar fascia. The digital fascia is commonly affected in conjunction with the palmar contractions, but rarely (as in this case) alone. The anatomical features of this case, therefore, seem to ally it with Dupuytren's contraction, and its occurrence demonstrates the reality of fascia contractions limited to the fingers. Hammer finger is the only other affection with which it could be classed. Several instances of what may be termed an acquired form of hammer finger that I have seen were possibly of the same character as this case; but, in the absence of a dissection showing definitely the nature of the lesion, they are not included in the present report.

Of the entire 50 cases the right hand was affected alone in 12 cases; left hand alone, 16 cases; both hands, 22 cases. Or in all. 72 hands were affected, the right hand in 34 instances, the left hand in 38. This indicates a nearly equal liability of both hands to the disease, with a slight difference in favor of the left.

Of the 31 cases in which there was contraction of the fingers as well as thickening and shortening of the fascia in the palm, there was finger contraction in the right hand alone in 10 cases, in the left hand alone in 13 cases, and in both hands in 8 cases—39 hands in all. These figures do not include 7 cases in which, in addition to actual finger contraction in one hand, the other hand had more or less fascia contraction confined to the palm, but without any fingers being bent; including these, the right hand was affected alone in 7 cases, left alone in 9 cases, and both hands in 15 cases.

In the 72 hands affected in the entire 50 cases, 101 fingers were involved in all, as follows: 1 thumb, 20 middle fingers, 50 ring fingers, 30 little fingers. These were distributed as follows with relation to each hand: middle finger alone, 6 hands; ring finger alone, 28 hands; little finger alone, 13 hands; ring and little fingers, 10 hands; middle and ring fingers, 8 hands; middle and little fingers, 2 hands; thumb and little finger, 1 hand; middle, ring, and little fingers, 4 hands. In the 22 cases in which both hands were affected the fingers involved in each were as follows: ring finger of one hand and ring and little fingers of the other, 4 cases; ring finger of one and middle finger of the other hand, 3 cases; middle finger of one and middle and ring of the other hand, both ring fingers, ring finger of one and little finger of the other hand, 2 cases of each; middle finger of one and middle, ring, and little fingers of the other hand, ring finger of one and middle and ring of the other, both little fingers, little finger of one and middle and ring of the other, little finger of one and ring and little of the other, thumb and little finger of one and middle and little fingers of the other hand, middle and ring of one and ring and little of the other, ring and little fingers of each hand, middle, ring, and little fingers of both hands, 1 case each.

Of all the fingers involved, 48 were contracted, in 40 hands of 32 cases (including the digital case), as follows: 1 thumb, 6 middle fingers, 22 ring fingers, 19 little fingers. These were distributed thus: Middle finger alone in 4 hands; ring finger alone, 17; little finger alone, 13; thumb and little finger, 1; ring and little fingers, 3; middle, ring, and little fingers, 2.

In the 48 contracted fingers the contraction consisted in a flexion of the proximal phalanx in 17, mostly by general traction on the skin or fibrous investments of the fingers; in 26 there was traction on and flexion of the middle phalanx, with or without flexion of the proximal phalanx also; in 2 the distal phalanx was contracted; in 1 (digital case) both the middle and distal phalanges were contracted; and in 2 the condition was indefinite. In one case the distal phalanx was hyperextended.

In 39 of the cases examined with reference to this point no observable abnormal tension or prominence of the tendon of the palmaris longus muscle could be detected in any instance, and this muscle appeared to have nothing whatever to do with the pathology or etiology of the disease. Noble Smith[1] in 45 cases found this tendon tense and prominent in nearly every instance, and to this circumstance he attributed an important share in the causation and pathology of the disease.

In order to determine the frequency with which Dupuytren's contraction occurs, a systematic examination was made of the hands of 1000 men, all ex-soldiers, in age ranging from twenty-one to eighty-five years, and averaging about fifty-three years; 35 of them were colored, of whom none were affected. Of the 1000 men, 40 (or 4 per cent.) had indubitable fascia contraction; in 13 of these cases the palm only was affected, without contraction of fingers, leaving 27 (or nearly 3 per cent. of the whole) having material contraction of the fingers. Noble Smith[2] among 700 elderly inmates of English workhouses found 70 cases (10 per cent.) of Dupuytren's contraction, in 15 of which the affection was confined to the palm. In 444 women examined by him 11 had well-marked finger contractions and 15 others had simply palmar induration; this would leave 256 men among whom occurred 44 cases, or 17 per cent. William Anderson[3] states that of 2600 adults of the poorer classes in certain English infirmaries, about five-sixths of whom were over middle age, 33, or 1.27 per cent., were affected in various degrees, while of 800 children under sixteen none were affected.

The family histories given were in most cases too imperfect to afford any reliable statistics as to the influence of heredity in the etiology of the disease. In 11 of the cases it was stated that the parents had had no finger contractions. In 3 cases a parent was known to have had a finger contraction; in one of these a mother and son each had both hands affected; in one a father and son each had the left hand affected; in one the father had both hands drawn up (possibly by paralytic contractures), the son having both hands affected.

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[1] British Medical Journal, February 7, 1885, p. 275.

[2] Loc. cit.

[3] Loc. cit.

The occupations pursued at and preceding the time of onset of the disease were stated as follows: farmer, 1; carpenter, 2; porter, 2; soldier, 11; sailor, 1; baker, 1; painter, 1; shoemaker, 2; salesman, 1; bartender, 1; florist (youth), 1; laborer, 7; light labor, 4; clerical occupations, 4; idle (pensioners), 9; unknown, 2. Forty-six were right-handed, two left-handed (with the left hand affected in one, both hands in the other), two not stated.

In 5 of the cases the origin of the lesion was attributed to local irritation incident to the occupation pursued, as holding reins (in this case the affected finger had been bitten by a centipede ten years before, followed by an abscess), lifting, using baker's shovel, playing baseball. In 2 other cases the contraction was thought to have developed after slightly blistering the palm (from using pick, and rubbing liniment on a horse). Two cases were attributed to a strain or wrench of the hands; in one of these the contractions were asserted to have been apparent on the following day. In 2 cases the contractions developed following lacerated wounds of the affected palm and of the tips of the affected fingers. In 3 cases there had been abscesses at the site of the lesions before the contractions appeared. In 1 case (Case II.) the affected finger had once been bruised or injured. This makes 15 cases in which, with greater or less probability, the disease could be associated with more or less recent irritation or traumatism. Besides these, in 2 cases the affected fingers had been injured thirty-five or more years before. In 30 cases there was no history of local irritation or traumatism, recent or remote.

In 42 of the cases there was a history of rheumatism, in at least half of which the rheumatic symptoms were only slight and occasional; the other half had rheumatic attacks of all grades of severity. In only 2 of these cases (Cases I. and III.) were there arthritic lesions affecting the small joints that exhibited any approach to gout. In 8 cases there was no history of rheumatism, nor, indeed, of any general disease at and for years subsequent to the onset of the contraction. In 10 cases rheumatism was marked in the arm, shoulder, wrist, or fingers of the affected side. In 4 of these the development of the fascia contraction was nearly simultaneous with marked or severe rheumatic outbreaks in the affected upper extremity, as follows: In two cases the symptoms consisted in muscular and articular pains; in one (Case I.) the contraction developed concurrently with a subacute rheumatic attack resulting in enlargement of the small joints of the hands; the other case, on account of the accompanying rheumatic and nervous phenomena, is here given:

CASE III.—Jos. B., born in 1830, in New York. He was a soldier, 1848–1862, and then a watchman, laborer, etc., until 1892. Since that time he has been a pensioner and inmate of the Soldiers' Home. In

1862 he received a sabre wound over the upper part of the left parietal bone, which disabled him only a few days. He has had heart disease over thirty-four years, and during the past twenty or thirty years has had several severe attacks of rheumatism, being at times laid up for months. His right shoulder was dislocated in March, 1894.

About the middle of January, 1896, he was seized with a severe attack of acute rheumatism, during which various joints were affected and a stiffening of his neck developed. During this attack a marked fascia contraction developed in both hands, the left hand preceding the right two or three weeks. When first examined, March 9, 1896, there was an acute arthritis in the right elbow and both wrists; the neck was stiff and immovable, with the head somewhat turned to the right and flexed on the chest, and the power of rotation, flexion, and extension of the head diminished to small limits; the trapezii were painful and tender. In the right palm a marked band of fascia contracted the little finger to about a right angle; slight bands to the ring and middle fingers were also present. In the left palm a highly elevated band from the interthenar space contracted the little finger to about a right angle; this band also gave off a branch to the ring finger, flexing it to about 135°; slight bands also extended from the interthena to the ring and middle fingers. The nervous symptoms were not fully examined at the time, but a few weeks later anæsthesia was found over the right side of the head and face, and the right upper and lower extremities; the right arm was somewhat paretic and atrophied; the elbow, wrist, and knee jerks on the right side were exaggerated. The cause of these symptoms, whether due to rheumatoid lesions of the cervical vertebræ or nerves, cervical meningitis, or some other obscure nervous disorder, was not definitely determined.

For over a year there was no change in the condition of the fascia contractions; but an examination on March 22, 1898, showed that a marked increase of the contraction in the left hand had occurred, the right hand being unchanged. The left middle, ring, and little fingers were stiffly contracted into and against the palm, in positions of extreme flexion.

Seven of the cases, including Case III., gave a history of nervous disease. In one case the affected hand had been the seat of writer's cramp for a year or two before the development of the contraction. In one case the affected hand and side were paralyzed when seen; in one case there had been temporary paralysis of both upper extremities eight years before the contraction appeared; in another there was an attack of hemiplegia thirteen years afterward. One patient became insane several years after the onset of the contraction; one was demented and markedly syphilitic.

One case, in addition to severe chronic rheumatism, had marked glycosuria and polyuria, but without any disabling symptoms of diabetes mellitus. Another also had glycosuria. One had bronchial asthma. Several had cardiac and pulmonary disease, and a number, when observed, were senile. Two had suffered old fractures of the forearm of the affected hand, and one had several years before had a gunshot wound of the wrist of one of the affected hands.

In 45 of the cases the age at which the disease first appeared was determined with tolerable accuracy, as follows: Under twenty years, 1 case; from thirty to thirty-nine years, 7; forty to forty-nine years, 6; fifty to fifty-nine years, 16; sixty to sixty-nine years, 12; seventy to seventy-nine years, 3. These figures indicate that the favorite age of onset is from fifty to seventy years, and that it is rare under thirty years.

The onset and development of the contraction were in most cases insidious and gradual, being manifested only by the slow development of the induration and deformity without any subjective sensations. In only two cases were any symptoms noted preceding the appearance of the contraction; in one a stinging pain was felt in the palm previous to the onset; in the other the appearance of the contraction was preceded by a swelling along the finger and portion of the palm afterward affected, together with stinging pains from the finger-tip to the elbow. The period of development of the contractions, from their first appearance to the maximum attained in each instance, usually varied from a few months to two or three or four years. In a very few cases the contraction was stated to have developed in the course of a few weeks. In some of the bilateral cases the disease reached its full development in a few months in the hand first affected, and then after a quiescent period of perhaps years the other hand began to contract, reaching its maximum in a short period. This, perhaps, indicates a certain amount of intermittency in the active stages of the disease. In two cases of fifteen years' standing and one of five years' duration the patients positively stated that the contraction was still increasing. In one case of five years' standing, under my observation for a year, progress was still evident from comparative measurements; in another case of four years' standing, under observation for three years, intermittent increments of the contracted condition were observed. The other cases when observed were, with one exception, apparently in a stationary condition. The statement is frequently made in descriptions of this disease that the contractions continue to progress indefinitely. My observations, however, indicate that the disease, whether slight or severe, as a rule has a definite period of development, and then remains stationary. It is true that contractions of all degrees of severity, from slight induration in the palm to extreme flexion of the fingers, are met with; but this is not due to contractions being seen in all stages of development, but to the fact that in each instance the disease has, with few exceptions, attained a maximum and is stationary. The actual active period of the disease, the period of development, is comprised within a few months or years.

Subjective symptoms, pain, tenderness, or abnormal sensations connected with and located in the seat of the contraction, were exceptional.

In a few cases tenderness was complained of when the affected projecting surfaces were exposed to the irritation of manual work; and in some instances there were pains in the affected hand or wrist that seemed to be purely rheumatic. Including these two classes, there were thirty-five or thirty-six cases in which no pain had been present properly referable to the disease. In ten or eleven cases there was a history of pain or other subjective sensations apparently distinctly associated with the lesions. Two cases in which the onset of the contraction was preceded by pain have been referred to. In several cases the pain was worse or existed only during the early period of the contraction. In one case pain appeared four or five years after the contraction. In most of the cases in which pain existed at all it occurred at intervals after the full establishment of the contraction, as well as during its period of development. The pain was described in the majority of the cases as an occasional stinging or pricking sensation in the affected region; also as a feeling of numbness or itching; in two or three instances as a dull, aching pain; in one case as occasional sharp, shooting pains. One or two complained of constant tenderness. In one case the abnormal sensation was stated as a feeling of tension in the palm.

In 22 cases both hands were affected. The contraction developed in the right hand first in 5 cases; in the left hand first in 4 cases; in 1 case it was stated that both hands became affected simultaneously. The interval between the development of the contraction in the two hands varied from a few weeks or months to four or five years; in one instance ten years elapsed between the two. In 12 cases it was not known which hand was first affected. So far as could be ascertained, the hand first affected was the one worst affected. The right hand was the worst affected in 11 cases; the left hand in 9 cases; both hands were about equally affected in 1 case. In a number of these cases, however, there was but little difference between the two hands; in others the hands were very unequally involved, one hand showing marked finger contractions while the other exhibited only slight palmar induration. When both hands are involved, therefore, they are usually affected to an unequal degree; further, the lesions are not exactly symmetrical in most cases, but have different locations in the two hands.

The milder degrees of the disease do not cause trouble or discomfort, and only exceptionally are any of the cases attended with pain. The severer forms of the contraction constitute material deformity and disability, the exposed areas in the palm being unduly subjected to pressure and irritation in the use of the hand, the contracted finger being awkward and in the way, and the function of the finger being impaired by its lack of extensibility. In such cases occupations requiring the use of the hand may be interfered with.

The condition once established is permanent unless obviated by surgical measures. In three or four of the cases, it is stated that after the contraction attained its maximum it diminished a little, perhaps by some compensatory relaxation; such improvement is but slight. In one case a bent ring finger was caught in a large dog's collar and given a severe pull, which ruptured the contracted fascia and lacerated the skin in the palm, and thus released the finger; the wounds healed without recontraction, so that the disability was nearly removed by this accidental forcible divulsion.

The diagnosis of the condition from other affections of the hand is usually unattended with difficulty. The bent finger, the ridge in the palm corresponding to the contracted band, the rounded, callus-like indurations, the small wristward inversions of the skin, and the definite location of the lesions are characteristic features which even in mild cases distinguish this affection. Even faint stigmata of the disease are quite distinguishable. Finger contractions resulting from paralytic conditions are readily recognized. Contractions from tendon lesions do not exhibit the characteristic surface changes of fascia contraction. In cicatricial contractions there is the history of injury and absence of the typical features of Dupuytren's disease; in a few of the cases here considered there were antecedent wounds and cicatrices, but the pictures presented were of unquestionable fascia contractions. Deformities caused by the various affections of the joints are recognizable by the history, anatomical conditions presented, or accompanying constitutional condition; these conditions and Dupuytren's disease may coexist, however, introducing an element of doubt as to the precise share either may have in the production of the deformity present. Hands are frequently seen in old men and hard manual workers in which the fingers are generally and equally slightly contracted, while the skin of the palm is hard and shrunken; this is probably due to a general induration and slight contraction of the skin and subcutaneous tissue, and is quite different from the localized hypertrophy of Dupuytren's disease.

The diagnosis of contractions limited to the digital fascia is more difficult, as in the absence of skin changes the deformity may be very similar to contractions due to arthritic or other causes. The reality of such digital cases is demonstrated by the dissection above described. There is a class of cases, comprehended under the designation "hammer finger," the differentiation of which from contractions of the digital fascia in many cases might prove difficult. Hammer finger consists in a flexion of, usually, the middle phalanx of the little finger on the proximal phalanx; it is usually described as a congenital or developmental affection, and is said to be due to abnormal shortness of the lateral ligaments of the affected joint. I have seen several cases otherwise exhibiting all the external clinical features of hammer finger which developed in adult life—that is, were acquired rather than congenital. It is possible that some of these cases of acquired hammer finger may be due to contraction of the digital fascia; but, as in the cases observed I was unable to demonstrate that fact beyond doubt, I have excluded them from this collection of cases. Two of the cases of fascia contraction here considered exhibited what I regarded as hammer finger, in addition to Dupuytren contractions; the two fingers thus affected are not included in the statistics. It is quite possible that some cases diagnosticated and recorded as Dupuytren's contraction, especially the alleged congenital cases, are in reality examples of hammer finger.

The etiology and pathology of Dupuytren's contraction have never been satisfactorily determined, and very diverse theories of its causation have been held. One theory, held among others by Dupuytren, is that the disease is caused by slight local traumatisms or by continuous use and irritation of the palm incident to manual labor. In the cases here considered the lesion was attributed with more or less probability to local causes in scarcely one-third of all the cases. Some of those affected were engaged in manual occupations, but a considerable proportion were not, and some were entirely idle. The nature of the occupation habitually pursued is not, however, always a safe criterion as to the occurrence of palmar irritation, since the hand inured to labor is hardened and toughened, tolerant to the extra usage to which it is exposed, and more immune to local irritation; while the softer hand of the person not engaged in hard manual work is easily blistered or irritated on the occasions, almost inevitable even with idle persons, when any unaccustomed use or unusual strain is put upon the hand. Thus, in the case of a clerk an abscess developed from irritation caused by the use of gardening tools during leisure moments; subsequent to this a fascia contraction appeared. Another man, who was idle, attributed the contraction to a strain of his hands incurred in turning a tight faucet. In scarcely any of the cases in which the lesion was attributed to local causes was the history sufficiently distinct and the connection sufficiently authentic to warrant positive conclusions as to the existence of any relation between the two. It is possible that local injuries or irritation might occur too slight to be remembered, yet sufficient to excite fascia contraction; this consideration, however, cannot validate any assumption that in all cases a forgotten traumatism must have occurred, especially as in the majority of cases there is a complete absence of such history. On the whole, so far as the histories go, the facts observed in this series of cases are decidedly adverse to the supposition that the disease is essentially due to local traumatic causes.

There are other considerations opposed to the theory of the traumatic origin and in favor of the contrary view of the idiopathic origin of the disease. The favorite age of onset is after middle life, years after the period of active labor begins; still, this consideration is qualified by the fact that the senile period is more subject to cirrhotic changes than the earlier periods of life. The left hand is as frequently affected as the more-used right, and the ring and little fingers much more frequently than the radial half of the hand, which bears the brunt of labor equally if not to a greater degree. If due to traumatism there would seem to be no reason why the disease should not be commoner than it is. The marked influence of heredity observed in this affection, the limitation of the disease to distinct longitudinal tracts, the secondary development of contractions in the other hand after one has become affected, are unexplainable on the local traumatic theory. There is little doubt that Dupuytren's contraction is essentially of idiopathic origin, and that local traumatisms, such as occupation-use, irritation, wounds, or abscesses, have no more than, perhaps, some occasional influence in lighting up the disease.

A germ theory of the causation of the disease is not wanting. Anderson[1] believes "strongly that the active cause of the disease is a chronic inflammation probably set up by a micro-organism, which gains access to the subcutaneous tissue through accidental lesions of the epidermis." This theory does not seem probable in view of the protracted and benign course of the disease and the absence of inflammatory phenomena; and especially as it throws no light on the bilateral occurrence of the lesions or the influence of heredity.

The theory that the disease is a manifestation of some constitutional condition, such as gout, rheumatism, and the like, has been widely held. The cases observed are rather suggestive as to some relationship of the disease with rheumatic or rheumatoid disorders. In 42 cases (84 per cent.) there was a rheumatic history, in about 20 of which rheumatic attacks had been more or less severe. This would seem to be a significant proportion; this consideration, however, loses much of its significance in view of the fact that the class of men from which these cases came were very prone to rheumatic trouble, and any like number of them of corresponding ages unaffected with Dupuytren's contraction, selected at random, would probably present about the same proportion of rheumatic cases. The occurrence of 8 cases entirely without history of rheumatism or any allied condition shows that the latter diseases cannot be the sole essential cause of the fascia contraction. The few cases in which the development of the contraction was associated with an arthritic outbreak (like Cases I. and III.) may have been coincidences, or the histories may not have been correctly stated; or it may be true that occasionally rheumatic disorders, especially if local, may have some contributing or exciting influence upon the lesion in question. My observations do not lead me to the belief that the condition is a manifestation of, or is essentially and specifically caused by, rheumatic or rheumatoid disease.

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[1] Loc. cit.

That true gout is its specific cause can hardly be successfully maintained. The disease occurs in America, where typical gout is uncommon, and among social classes not subject to gout. In only a very small proportion of the cases observed by me was there any personal or family history that could be construed as gouty. In many of the cases cited in support of the gouty theory the evidences of gout are vague and remote, and there is little to indicate that the coexistence of the two conditions is more than coincidental; and the argument that when no other gouty manifestation is present the contraction is itself the symptom which shows the existence of gout is an instance of circular reasoning. C. B. Lockwood[1] has reported a dissection in which the joints generally were infiltrated with urate of sodium and had undergone extensive pathological changes; there was a fascial contraction of one finger, and the band was abundantly impregnated with crystals of sodium urate, which was continuous with the deposits surrounding the flexed phalangeal joint. Here there was a distinct association with a gouty condition, but whether the relation was causative does not appear; the case, however, is exceptional.

That Dupuytren's contraction is a manifestation of any other constitutional condition, such as diabetes or syphilis, I see no reason to believe.

The possibility of the nervous origin of the disease is worthy of consideration. The marked predilection of the disease for the ulnar side of the hand shows to some degree a relation with the distribution of the ulnar nerve. The pricking or tingling sensation specified in most of the few cases complaining of pain is quite suggestive of the paræsthesia of a nervous lesion. The involvement of both hands, one being affected subsequently to and to a less degree than the other, may point to the operation of sympathetic (nervous) action in reproducing the disease on the side opposite to that first affected. Some very suggestive cases are on record in which Dupuytren's contraction was associated with nervous disease producing trophic lesions, as syringomyelia, anterior poliomyelitis; Case III. is similarly suggestive. In a case reported by Lange,[2] a woman who had a contraction of both ring fingers had an attack of left hemiplegia, almost immediately after which the contraction in the left hand disappeared, the right palm remaining unchanged. G. C. Kingsbury[3] has reported a case of fascia contraction in both hands, apparently associated with some form of occupation neurosis, in which the contractions, pain, and cramps entirely disappeared after two hypnotic séances. These two curious cases may have some significance as to the trophic origin of the disease. Of the entire fifty cases observed by me, however, only seven gave a history of known nervous disorders; it is, of course, possible that obscure trophic influences might exist adequate to cause this disease, but without other manifestations. While a neuropathic or trophic theory of the pathology of Dupuytren's disease would be attractive and is supported by some considerations, it cannot as yet be regarded as having sufficient basis for final acceptance.

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[1] Transactions of the Pathological Society of London, 1885-1886, vol. xxxvii. p. 557.

[2] Cited in Buck's Reference Hand-book of the Medical Sciences, vol. iii. p. 499.

[3] British Medical Journal, January 10, 1891, p. 62.

Robert Abbe has presented a detailed neuropathic theory of this disease.[1] He considers the original cause to be a slight traumatism of the palm, often forgotten; this peripheral irritation produces a central spinal impression which then sends a reflex influence to the part originally hurt and incites a contraction of the fascia. This contraction sets up a second series of reflex symptoms, and by sympathetic action causes a reproduction of the trouble in the corresponding part of the opposite hand. He lays stress upon the irritation of the original traumatism or the tense contractions being an exciting cause of neuralgias, local and distant, joint inflammations, and other symptoms simulating rheumatism and gout, and various general symptoms and neuroses, and cites cases in which these disorders were relieved by operation on the contracted fascia. In very few of the cases observed by me were there any such symptoms that could in any way be attributed to the contractions. On the contrary, in most cases the lesion was the seat of little or no irritation and seemed perfectly benign and innocuous.

Dupuytren's contraction is one of the scleroses, a hypertrophy or hyperplasia of connective-tissue elements; it might well be termed palmar sclerosis. Among the principal affections of this class are the visceral cirrhoses, as of the liver, kidney, and lungs, arteriosclerosis, and the various spinal scleroses. They are all diseases to which the late adult or senile period of life is especially subject, as is also contraction of the palmar fascia, the anatomical characters of which ally it with them. The spinal scleroses, locomotor ataxia, antero-lateral sclerosis, multiple sclerosis, etc., offer some points of analogy with palmar sclerosis in their obscure causation and the specific limitation of the lesions to definite longitudinal tracts. Interstitial pneumonia is secondary to other forms of pulmonary disease. Cirrhoses of the liver and kidney are chiefly due to prolonged irritation of toxic substances circulating in the blood. Arteriosclerosis is due to similar causes, also to the irritative effects of habitual overdistention and to hereditary influences. Interstitial disease of the heart substance is associated with arterial sclerosis. These disorders show a marked association with toxæmic and other irritation, and this relationship suggests a similar causation for Dupuytren's disease. This recalls the theory of the connection of this disease with gout, or lithiasis, which is one of the forms of toxæmia. Why the palm, rather than other regions, should suffer in this manner from irritants circulating in the blood, and especially why the hypertrophy should be limited to specific longitudinal fasciculi in the palm, does not appear. One would expect more general consequences from either local or toxic irritation. Dupuytren's contraction differs from the visceral scleroses in being sharply localized, while the latter are diffuse and general. Toxæmia does not appear to be a very probable cause of palmar sclerosis.

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[1] Medical Record, New York, March 3, 1888, p. 236.

Contractions of the plantar fascia have been reported, analogous to those of the palm; cases of induration or contraction of the penis, associated with Dupuytren's disease, are also recorded. Keloid, fibromata, and cicatrices are allied in some respects to palmar sclerosis. The contraction of ligamentous structures in talipes and in joint lesions, and of cicatrices, also presents some analogies, especially with respect to longitudinal shortening.

The only conclusion as to etiology that seems warranted is that Dupuytren's contraction is of idiopathic origin, most apt to occur in the senile period, and showing marked hereditary influence. There is no one known constitutional disease with which it is exclusively associated or of which alone it is a manifestation. It does not appear to be specifically caused by local irritation or traumatism, though this factor, as well as local or constitutional pathological conditions, may at times have some exciting or contributing influence. Perhaps it is a neuropathic or trophic condition.

EMPYEMA OF THE FRONTAL SINUSES AND INTRACRANIAL INFECTION.

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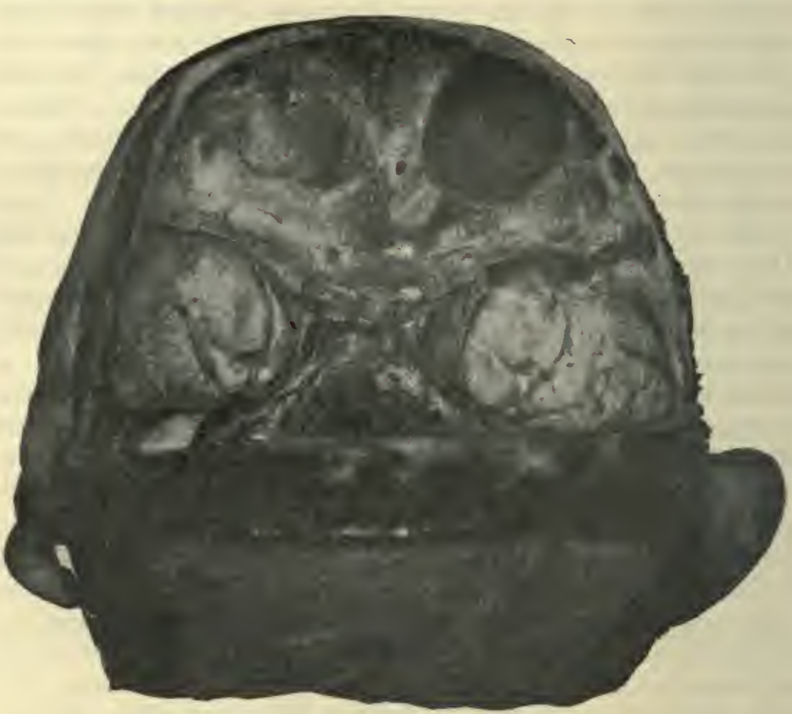
The writer has been able to find but very meagre details concerning the severer forms of suppuration in the cavity of the frontal sinuses. Even the special works devoted to such subjects make scarcely any reference to the possible extension of this form of infection to the interior of the skull. Assuming, therefore, that these severe conditions are comparatively rare, the writer has ventured to report at some length a case of this nature which presents uncommon and almost unique features.

Case I.—J. C., male, aged thirty-two years, entered St. Luke's Hospital February 20, 1897. There is nothing in his antecedent history which has a bearing on his present trouble. In September, 1895, a swelling was noticed at the inner angle of the left orbit; five days after its appearance it was lanced and pus evacuated. A sinus persisted, and a year later the left frontal sinus was trephined at another institution and the cavity drained externally. No attempt was made to establish drainage through the nose. This operation brought no relief; the sinus still persists and discharges a small amount of pus all the time. At various times in the last two years he has had polypi removed from his nose. He thinks his original manifestations of trouble with his nose and frontal sinus date back some three years. He now seeks relief from the annoyance of the discharging sinus, and for persistent frontal headache, most marked of late on the *right* side. Has lost about fifteen pounds.



Interior or the base of the skull, showing bony defect between the cranial cavity and the right frontal sinus.

Physical examination reveals nothing of note except the local condition. At the inner extremity of the left eyebrow is a narrow sinus discharging pus. It readily admits a silver probe, which passes directly back one and three-quarter inches before it meets any resistance. No bare bone is felt, but no energetic manipulations are undertaken. Percussion of the forehead elicits a vague and unlocalized pain. Both nostrils are obstructed by polypi.

Operation, February 27th. The left eyebrow is shaved and the surrounding skin disinfected. Ether anæsthesia. Horizontal incision in line of eyebrow including the sinus at its central portion. Fistulous opening freely enlarged with gouge, evacuating a considerable amount of pus. Cavity freely scraped with a Volkmann spoon, except for the posterior wall, where there was danger of perforating the softened bone. In applying the spoon to the septum it easily penetrates into the *right* frontal sinus and lets out about two drachms of pus, which appears to be under considerable tension. (There is no pulsation, however.) Cavity irrigated with saline solution; no fluid escapes through the nose. An attempt to pass a probe through the infundibulum on the left side from above downward fails, but succeeds quite readily when the probe is passed upward through the nose. It is believed that, as the two sinuses have been practically converted into one and there is double drainage, externally and below, a further external opening over the right sinus can be omitted, unless time should prove its necessity. A piece of rubber drainage tube is passed downward through the nose in accordance with the valuable advice of Dr. D. Bryson Delavan. The tube is brought out through the external opening and through the nose. It is intended to keep the canal open, but not *per se* to effect drainage. On irrigating through the external opening the tube is made taut, thereby diminishing its calibre and allowing the fluid to run down alongside of it.

Recovered well from the anæsthetic. The following day complained of soreness in the back of the head. Two days after operation there developed stiffness of the neck, twitching of the facial muscles—in short, a typical meningitis. After three days there was a remarkable temporary remission of symptoms, mind became clear, and he sat up in bed and wrote letters. He soon relapsed, and died nine days after operation, with all the evidences of a septic meningitis.

During life the cavity of the frontal sinuses had been washed out through the external opening several times in the course of the day. It was soon noted that this procedure was followed by a marked aggravation of symptoms, and it was realized that a direct communication with the interior of the cranium must exist.

Autopsy by Dr. Van Horne Norrie. Brain: Intense congestion of pia. Moderate amount of pus in the pia at the base of the brain, especially over the pons and the cerebellum. Slight flattening of the under surface of the frontal lobe on the left side. The cerebral wall of the right frontal sinus is entirely wanting, there being a loss of substance at that point one inch in diameter. The opening is in the form of a nearly perfect circle; its edges are smooth and well defined. The anterior wall is continuous with the inner surface of the skull. A slight edge of bone separates the cavity of the frontal sinus internally from the cranial cavity. Above and posteriorly it is closed in by thickened dura. The outer surface of the dura at this point is very much thickened, covered with granulation tissue and blood. The cribriform plate is carious, especially on the right side. An angular mass of bone (cerebral wall) projects about three-quarters of an inch above the site of the *left* frontal sinus, pressing laterally against the crista galli. Upper surface of this bony mass presents two openings, one small, the other half a centimetre posterior to the first and communicating with the frontal sinus.

Diagnosis. Empyema of the frontal sinuses, caries of frontal bone, purulent meningitis.

The condition of the cerebral wall of the left frontal sinus, as found at the autopsy, had been recognized during life as a probability, and was not surprising as a result of a long-standing suppuration of the mucous membrane, extending to and perforating the bony partition. It may be mentioned here, however, that intracranial infection may complicate an ordinary sinus empyema without the existence of any recognizable bony perforation.

As will be seen by referring to the account of the operation, the failure to make a second external opening over the right frontal sinus rendered thorough exploration of the cerebral wall and the recognition of its condition impossible. Therefore, the result of the autopsy, showing the entire absence of this bony partition and the resulting wide communication between the cavities of the sinus and the skull, was naturally surprising. Such a condition is almost unheard of, and could scarcely have been foreseen, as at the most one would expect simply to find such evidences of erosion as were found on the other side.

One naturally seeks to find a suitable explanation for so marked and unusual conditions. Etiologically a number of factors might, on theoretical grounds, be offered as responsible for this bony defect. Practically we are reduced to the following:

1. Destruction of the bony wall by extension of a suppurative process originating in the frontal sinus—empyema.

2. Destructive inflammation originating in the inner table of the frontal bone.

3. Structural deficiency of the inner table at the usual site of the cerebral wall of the frontal sinus.

What the writer is now inclined to believe to be the probable condition was not present in his mind when the anatomical conditions present were revealed by the autopsy. The natural explanation then seemed to be that the long-standing suppurative process in the right frontal sinus, never having received any outward vent, had attacked and completely destroyed the thin posterior wall. This view seemed eminently reasonable, as the other side showed unmistakable, though much less extensive, evidences of such a process in the eroded areas of its cerebral wall. That the process here had not attained such a degree of severity might be attributed to the more or less free drainage during the past year and a half. When, on further reflection, the extent and symmetry, the well-defined and perfectly smooth edges of the bony defect were considered, it seemed difficult to reconcile these appearances with the probable action of a suppurative process acting by erosion. In the latter condition we ought to expect evidences of such destruction—softened, carious, irregular edges, etc.—while, on the contrary, we had to deal with appearances which might be compared to those of a casting from a mould. In seeking, then, for another explanation, the writer's attention was naturally directed toward the possibilities of the second group (2), it being believed that a process originating in the bone would be more likely to result in a loss of substance of better defined limits than in destruction by erosion or extension of a contiguous process.

While the explanation last mentioned had its attractions, it was realized that its probabilities were not very strong. The only process to be seriously considered was an osteomyelitis—a rare condition, especially if the term is rightly applied to describe a disease originating in the bone.

Out of the scanty literature the author has found scarcely any truly illustrative cases of this condition. The following case may be quoted to show that it does exist.[1]

Case II.—Male, aged sixteen years. When first seen had been ill six weeks and an abscess had opened spontaneously at two places on the forehead. Probe passed five to six centimetres directly into an abscess of the left frontal lobe. A free opening was made. On the posterior aspect the dura mater was seen covered with fungous granulations. It was opened by a crucial incision, disclosing an abscess of the frontal lobe. Following the operation there was an amelioration of symptoms; but a cerebral hernia subsequently developed, necessitating further operation. After having nearly obtained a cure, another focus made its appearance at a remote point, perforated the parietal bone, and infected the meninges, with a fatal result.

The reporter seems to have no doubt that here the process originated as an osteomyelitis, as it took less than three weeks to develop cerebral symptoms, the patient previously having been in perfect health.

The following cases are cited by Albert and Kolisko[2] as examples of osteomyelitis of this portion of the frontal bone:

Case III.—Man, aged twenty-six years. Symptoms dating back about five months. Left frontal sinus opened with chisel and hammer. The outflowing pus shows distinct pulsation. Good recovery; during convalescence pulsation accompanied discharge of pus.

Commenting on the history of the case, the authors remark:

"It may be objected that the patient simply had an empyema of the frontal sinus, as in the months of November and December (at the onset of the disease) there was a purulent discharge from the nose; this could be only a symptom of retention. The evident pulsation, synchronous with the heart's action, exhibited by the escaping fluid at the time of operation and subsequently, shows positively that the purulent focus was in direct communication posteriorly with the interior of the skull. Secondly, there was a bulging of the bone (forward?). Thirdly, the situation of the tumefaction was such that it can at all events be granted that there was probably a temporary suppuration into the adjoining frontal sinus, just as the knee-joint becomes involved when there is an osteomyelitis of the lower end of the femur; the roof of the frontal sinus was, however, the seat of an abscess."

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[1] Ricardo Botey. "Traitement des sinusites frontales chroniques et des lésions intra-craniennes consecutives." Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie, January 16, 1897.

[2] Beiträge zur Kenntniss der Osteomyelitis. Vienna, 1896.

It will be noted that the foregoing history and comments give no proof of the recognition, either by sight or by touch, of a destructive bony process, no evidence of its location or size, whether multiple or single. Except for the statement of the authors' belief to the contrary, nothing is adduced to show that this was not an ordinary empyema with extension of the process to the bony wall. There is also nothing in this case to show that there was not a condition exactly similar to that which was found to be present in the case under consideration.

In the following example the same authors are perfectly certain of their ground:[1]

Case IV.—Man, aged twenty years. Symptoms of two months' duration. Incision over prominent swelling in right superciliary region. Pus was evacuated, when pulsation at once became apparent. The purulent focus here was at a point "remote from the frontal sinus." Two years later patient reported that on numerous occasions bony particles had come away.

To the writer's thinking, neither of these cases should be accepted as instances of osteomyelitis of the cerebral wall of the frontal sinus.

It may be that in the case which is the subject of this paper the disease began as an osteomyelitis, but there is little evidence in favor of such a view, except that the onset was apparently quite acute. As between osteomyelitis and ordinary empyema, the chances are in favor of the latter, as there was an etiological factor, chronic nasal irritation, and the whole history of the case was not incompatible with that of a possible frontal sinus empyema. The exquisite anatomical conditions found on the right side do not, in the writer's opinion, justify the belief that the bony defect was necessarily the result of an inflammatory process *per se*. It is readily conceded that the disease was originally a simple empyema of the antrum, but the bony defect is held to have been a probable intercurrent factor and not a sequence of the original disease.

If, therefore, we eliminate as exciting causes an ordinary empyema with secondary destruction of the inner table, and a primary osseous suppuration, the theory of a structural malformation alone remains to be considered. (We cannot classify this structural malformation as a congenital defect, as the frontal sinuses do not make their appearance until a variable period in early childhood. Their existence is due to the absorption of bone between the inner and outer tables of the skull at that point.)

The existence of such a defect as is described in this paper must be a very rare condition. The writer had been unable to find any mention of such a condition, when he became greatly indebted to the courtesy of Dr. Thomas Dwight, Professor of Anatomy in the Harvard Medical School, for furnishing him with a reference to a case described by Zuckerkandl.[1]

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[1] "Keinen Zweifel liess ein anderer Fall zu."

The appearances found are described as follows: Upon separation of the dura there was seen in the orbital roof (left side) a bony opening about the size of a lentil, the edges being sharp and exceptionally thin. On its under surface it was shut off by the lining membrane of the frontal sinus. The important point is that in such a case the soft parts within the frontal sinus are in contact with the dura mater.

It will be noted that the above represents a condition simply of bony deficiency, not of a disease. The appearances of the parts as described above correspond quite closely to those described in this paper, except that the latter are more extensive and are complicated with the element of suppuration. History repeats itself, and, although such an appearance, with the exception of Zuckerkandl's case, would seem to be unique, there are probably similar conditions either unknown to the writer or as yet unrecorded. If a defect on the cerebral wall is a rare occurrence, it is much less so with regard to the outer table, where defects of the floor leading into the orbit have been noted with comparative frequency; and it seems reasonable to believe that the causes responsible for the latter condition may occasionally affect the cerebral wall also. That a defect exists may be attributed to the unevenness or excess of the bony absorption to which the frontal sinus owes its existence. For the larger varieties of sinuses probably more than an absorption is necessary: there must be a bulging or expansion of their walls. If a small, bony lacuna exists at a central point before a marked expansion takes place, a considerable increase in size of the original hole must result.

The writer believes, therefore, that, in view of the various facts that have been brought out, a statement of the features of his case would be correctly expressed by the following:

First, nasal trouble, starting up a left frontal sinusitis; with persistence of the trouble, beginning caries of the cerebral wall on that side. At a probably much later period infection of the *right* frontal sinus, either from the left side, but more probably from the nose, or from both. On this side the cerebral wall was the site of a structural defect, so that there was no bony partition between the cavities of the sinus and the skull, and infection of the cerebral covering necessarily resulted.

While the object of this paper seeks to call attention to a rather uncommon phase in the pathological anatomy of the frontal sinuses, and not to consider the general principles of treatment of empyema of these sinuses, it may not be out of place to attempt to draw some conclusions from the lesson taught by the facts brought out by the clinical history and the post-mortem findings. In reviewing the latter it would seem that under possibly similar conditions certain variations from the course pursued might be made to advantage.

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[1] Normale und pathologische Anatomie der Nasenhöhle, Band i. p. 333. Second edition, 1893.

The autopsy showed that the writer was justified in having relied on a single external opening over one of the sinuses, supplemented by nasal drainage, properly to remove the secretions, as both sinuses were found to be completely free of pus. This failure, however, to make an opening so situated that every part of the sinus could be explored the writer now believes to have been a distinct mistake. Certainly one external opening, unless situated in the median line and of a sufficient extent, fails to give proper facilities for exploration, and this step, in the light of the experience quoted, is absolutely necessary for carrying out an efficient line of treatment.

Tilley[1] recommends a median incision even when only one sinus is affected. He makes an incision from about the root of the nose below, continued upward in the median line for one and a half to two inches, then, having raised the periosteum from the bone over the position of the sinus, the former, with the other soft parts, is drawn to one side, thus fully exposing the bone, which may be removed by gouge and mallet or trephine. The latter is applied to the nasal portion of the frontal bone, between the vertical median line and a line drawn vertically upward from the internal angular process, it will in all cases open the sinus on that side, if one exists. If it was found that the sinus was a very large one, and that it was necessary to make an incision at a right angle to the vertical one, passing outward in the line of the eyebrow. A very manifest advantage of the median vertical incision is that the scar is in the median line, and, being in the direction of natural skin, cleavage is scarcely noticeable a few weeks after operation. By locating the exterior opening as near as possible to the nose it seems to facilitate access to the infundibulum.

If, on examination, the bone is found to be eroded or perforated, it should be carefully scraped or gnawed away to the extent found necessary. If an extradural abscess is found it should be explored and any pockets broken up and outlying recesses drained. Whether the dura is to be opened for the purpose of exploration must remain an open question, to be judged by the appearance of the process, the intensity and duration of the symptoms. Should the underlying cerebral substance present any apparent changes from its normal consistency, opening of the dura or puncture with the exploring needle, or both, will probably be in order; and if intracerebral suppuration is discovered it must be treated on general principles. In case such radical procedures are indicated, the osseous openings, internal and external, will necessarily have to be made as large as possible. The possibility of a complicating cerebral hernia should be borne in mind, and forestalled, if possible, by suitable packing.

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[1] Lancet, 1896, ii. p. 866.

Irrigation, unless the absence of bony perforatiou is absolutely demonstrated, should never be employed after the experience gained by the consideration of this case, in which it was apparently the direct cause of death, setting up an increased tension in the old focus, with rapid spread of the infectious agents. It would seem likewise unwise, if a communication with the interior of the skull has been found, to establish a communication downward into the nose; for, on theoretical ground, certainly a communication between the two cavities should be rigidly avoided. Should the patient eventually recover, and the channel into the skull become firmly obliterated, drainage downward might be instituted at a later period if the external sinus failed to close. Likewise, after long continuance of a fistulous tract, its excision and closure by a plastic operation might be possible after establishing nasal drainage. (Botey.)

46 West Thirty-third Street.

THE RELATION OF THE TRACHEA AND BRONCHI TO THE THORACIC WALLS, AS DETERMINED BY THE RÖNTGEN RAYS.[1]

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The relations of the trachea and the bronchi to the chest-wall, although of value to the diagnostician and the therapeutist, have been practically hypothetical, chiefly on account of the inherent difficulties in demonstrating them.

These difficulties have been largely overcome by skiagraphy, which enables us, as it were, to look through the more transparent tissues of the thorax, and, while retaining the bony landmarks in the view, see the bronchial tree accurately outlined against them. In order to render this possible the bronchial tree has to be made impervious to the rays, which is easily done by the injection of a proper substance.

Certain precautions, however, have to be taken. The opaque substance must not fill the smaller air-passages, for if it does the course of the larger bronchi will be obscured. To prevent distortion or sagging from the weight of the injection mass the whole body should be hardened. The mass should be as impervious as possible to the rays.

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[1] Read before the tenth annual meeting of the Association of American Anatomists, held at Ithaca, December, 1897.

In preparing the subjects from which the accompanying skiagraphs were taken, the following method was employed.

The bodies were first hardened by injecting the arteries with a solution of formalin, and then the bronchi were filled with a metallic alloy fusing at 155° F., forced in at a very moderate pressure. The skiagraphs were taken by Dr. Edward Leaming with the apparatus belonging to the College of Physicians and Surgeons.

In exposing the bodies to the rays they were placed as far as possible from the tube in order to obviate error in the projection of the shadow. The formalized bodies were found to offer considerable resistance to the passage of the rays, and thus several plates were spoiled by underexposure. The plate was placed four feet from the tube when the children were skiagraphed. When skiagraphing the adult it was found impossible with a reasonable length of exposure to obtain a skiagraph when the plate was placed at a distance greater than two feet. The exposure varied from one to five hours.

When the plate is placed behind the subject and the rays are passed through from before backward, the bones of the dorsal thoracic wall only appear on the plate, and in order to obtain radiographs of the sternum it was found necessary to pass the rays in the opposite direction after the removal of the dorsal thoracic wall.

In order better to understand the relations of the bronchial tree, it is well to review the course and distribution of the bronchi in the lungs.

Our knowledge upon this subject was exceedingly vague and indefinite until Aeby's[1] work was published in 1880. By making casts he was able to get a very fair idea of the ramifications of the tree. The descriptions of the bronchial tree in our anatomies have been based upon his conclusions, which may be briefly stated as follows: That the type of division of the bronchi is a monopodic and not a dichotomous one, namely, the main bronchus may be traced as a stem bronchus for some distance, and that it gives off four ventral and dorsal branches. Of these the ventral branches are the larger, as the stem bronchus is situated nearer the dorsal than the ventral aspect of the lung.

On the right side, however, beside the small cardiac or azygos bronchus, there is an additional ventral branch which passes above the right pulmonary artery and supplies the upper lobe of the right lung. This bronchus, from its relation to the artery, is known as the eparterial bronchus, and, according to Aeby and others, is not represented upon the left side. The remaining branches on both sides are known as hyparterial. It is extremely difficult to recognize Aeby's conception of a stem bronchus if a large number of corrosions of the bronchial tree are examined. If reference be had to Fig. 1 it will be seen that the stem rapidly becomes subordinated on account of the large size of the branches. In many corrosions the bronchi marked *B*, Fig. 1, break up into leashes of branches of nearly equal size. In fact, it will be found impracticable in the majority of cases to carry the stem further than this point.

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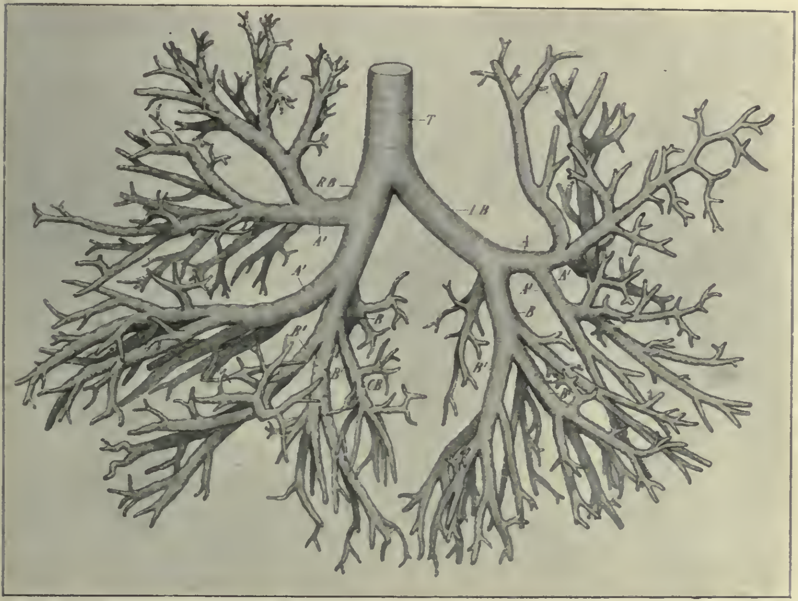
[1] C. Aeby. Der Bronchialbaum der Säugethiere und des Menschen.

FIG. 1.



Corrosion of the bronchial tree of an adult male Esquimau. *T.* Trachea. *L B.* Left bronchus. *R B.* Right bronchus. *A.* First hyparterial bronchus on left side. Its segments, *A′ A′*, correspond to *A′ A′* on the right side. On the right side the upper branch, *A′*, is the eparterial bronchus, the lower *A′* the first hyparterial bronchus. *B.* Continuation of stem bronchus, dividing into *B′ B′*. *C B.* Cardiac bronchus.

As described by Huntington,[1] these difficulties are avoided and a type is given which applies to the bronchial tree of the mammalia in general and better explains its ontogenetic development.

The left bronchus, *L B*, gives off a large branch, *A*, which divides into two secondary branches, *A′ A′*. It then continues on as a stem bronchus, *B*, which divides into two branches, *B′ B′*. Numerous other branches are given off, but as a rule this type can be recognized.

On the right side the arrangement is somewhat different, owing to

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[1] G. S. Huntington. The Eparterial Bronchial System of the Mammalia, Annals of the New York Academy of Sciences, xi. 9, 1898.

the suppression of the branch *A*, due to the migration of one of its segments, *A′*, to the main trunk above the pulmonary artery, thus forming the eparterial bronchus.

According to this hypothesis, then, the eparterial bronchus is the morphological equivalent of the upper segment of *A* on the left side, while the next ventral branch on the right side is the equivalent of the lower segment of *A* on the left side; otherwise the division of the bronchi are the same on both sides, with the exception of the cardiac bronchus on the right side. On the right side the eparterial bronchus supplies the upper lobe of the right lung, the remaining branch, *A′*, the middle; and the lower lobe is supplied by the continuation of the stem *B*.

On the left side the branches *A A′ A′* supply the upper lobe, and the lower lobe is supplied by *B*. The left upper lobe is thus seen to be the equivalent of the right upper and middle lobes, which differs from Aeby's conclusion, namely, that the upper lobe of the right lung is not represented on the left side. The first branches given off from the main stem are very large, nearly equalling in size the continuation of the stem. They mark an important point, for here foreign bodies may lodge or even pass into them.

Of the two primary brouchi the right is the larger, and its course is more in direct continuation of that of the trachea than the left. It has a slight curve with the concavity directed laterally. The left courses twice[1] as far as does the right before giving off its first branch. It describes a double curve—the first with its concavity directed upward and outward, over which the aorta and the left pulmonary artery pass, and the second with its concavity directed inward, conforming to the convexity of the heart. Both bronchi are nearer the dorsal than the ventral aspect of the lung. We thus have several causes determining the greater frequency of the entrance of foreign bodies into the right bronchus. First. The greater size of the right bronchus, which not only makes it capable of receiving larger bodies, but also throws the dividing spur between the bronchi to the left of the axis of the trachea. Second. The greater respiratory current. Third. The direction of the right bronchus—*i. e.*, conforming to that of the trachea.

The radiographs and diagrams demonstrate the relations of the bronchial tree to both the posterior and anterior thoracic walls, and in a manner as if one looked through the walls of the chest at the bronchi. Thus the right bronchus is on the observer's left in the anterior views and on the right in the posterior views.

Radiographs were taken of one adult, of children one and two years of age, and of one at birth. The figures are those of an adult chest.

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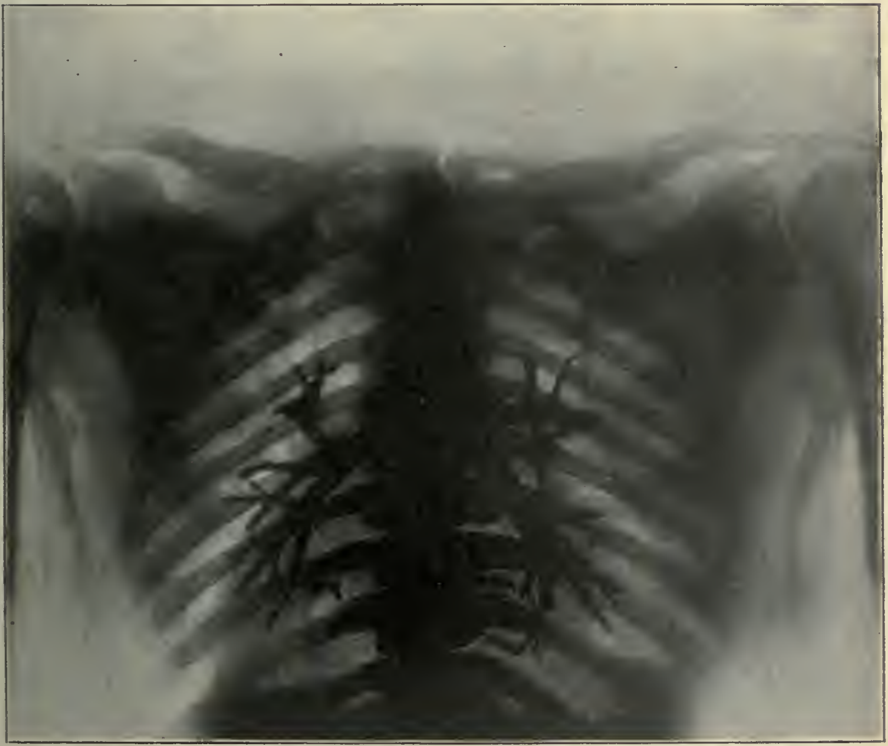
[1] According to Luschka, the right bronchus 2.5 cm., the left 5.1 cm.

At birth the relations do not differ from those of the older children. In young children the sternum is so transparent to the rays that radiographs were obtained only after painting the cartilage with oxide of lead. The diagrams were traced directly from the radiographs, and enough of the cartilages and other structures which were indistinct added to make them recognizable. The important relations are those of the trachea, the primary or stem bronchi, and the points where they give off their first branches. It would be superfluous to attempt the relations of the other secondary bronchi.

FIG. 2.



Adult male. Relations to posterior thoracic wall.

The trachea, which is in the median line at the lower part of the neck, lies in the right sternal line at its bifurcation, which corresponds to the right side of the centre of the vertebræ posteriorly.[1]

The deviation of the trachea is caused by the aorta, which crowds it to the right side. It bifurcates at about the level of the intervertebral disk between the fourth and fifth thoracic vertebræ, which point corresponds nearly to the tip of the fourth thoracic spine. This point is not absolute, as it is influenced by the respiratory movements and by the position of the head and neck.[1] In the radiograph it is somewhat lower in the adult, but it is as stated in the children. This point in the adult is below the level of the scapular spine—not at that level, as given by Joessel.[2]

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[1] For convenience in description the following perpendicular lines are taken:

1. The median line.
2. The sternal line, along the border of the sternum.
3. The mammillary line, through the nipple.
4. The parasternal line, midway between the sternal and the mammillary line.

FIG. 3.

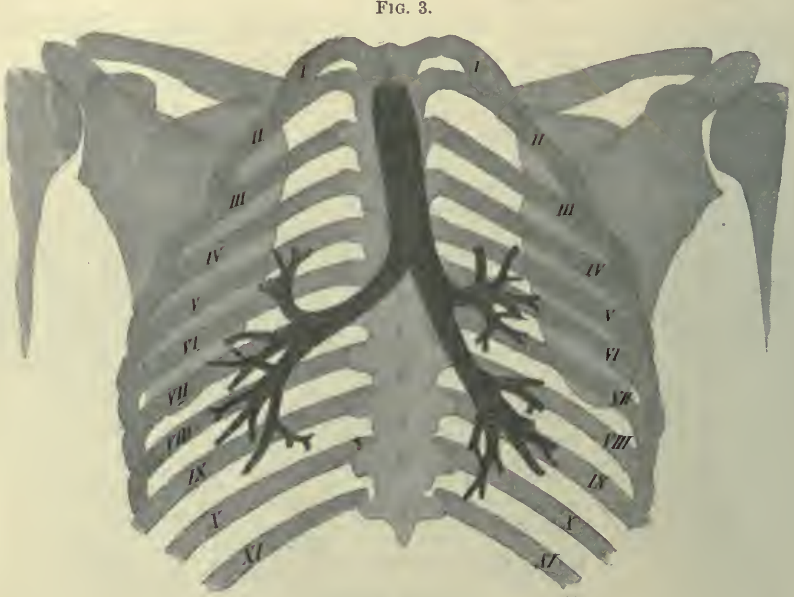

Diagram of Fig. 2.

On the anterior wall of the chest this point in the adult is just internal to the junction of the lower border of the second costal cartilage with the sternum.[3]

In the child, on account of the horizontal direction of the ribs and the consequent greater height of the sternum relative to the vertebræ, the point of bifurcation is under the right border of the sternum at the level of the third costal cartilage.

The stem bronchi, beginning at the bifurcation, end or become so small as to be negligible opposite a point on the posterior thoracic wall at the eighth rib situated in the adult on the left side three inches, and on the right side two inches, from the vertebral spine; in the child one and one-half inches and one inch, respectively. On the anterior thoracic wall these points are situated on the left side at the fifth rib just internal to the mammillary line, on the right side at the fifth rib in the parasternal line.

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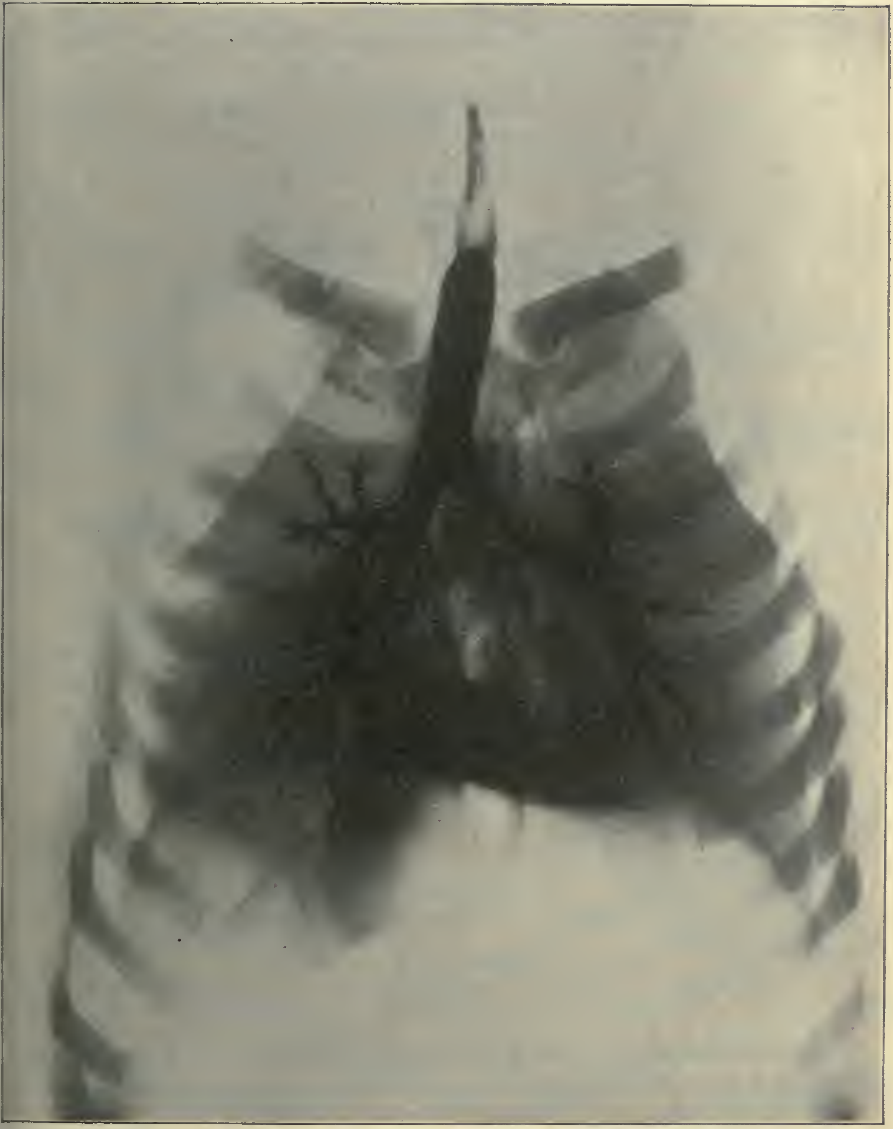
[1] Joessel gives it as opposite the fourth or fifth thoracic vertebra. Joessel. Topographisch-Chirurgische Anatomie, zweit. Theil, erste Abtheil.

[2] Ibid.

[3] The projection of the point of bifurcation in the adult on the anterior chest-wall was confirmed by section on four additional subjects previously formalized.

FIG. 4.



Adult male. Relations to anterior thoracic wall.

These data enable us to plot out the course of the stem bronchi on the posterior and anterior thoracic walls. On the posterior wall in the adult the course of the left bronchus is from a point to the right of the fourth thoracic spine to a point on the eighth rib three inches to the left of the spine. The course of the right bronchus is from the same point above to a point on the eighth rib two inches to the right of the spine. On the anterior wall in the adult the course of the left bronchus is from the lower part of the second right chondro-sternal articulation to a point on the fifth rib just internal to the mammillary, and of the right bronchus from the same point above to the intersection of the fifth rib with the parasternal line.

FIG. 5.

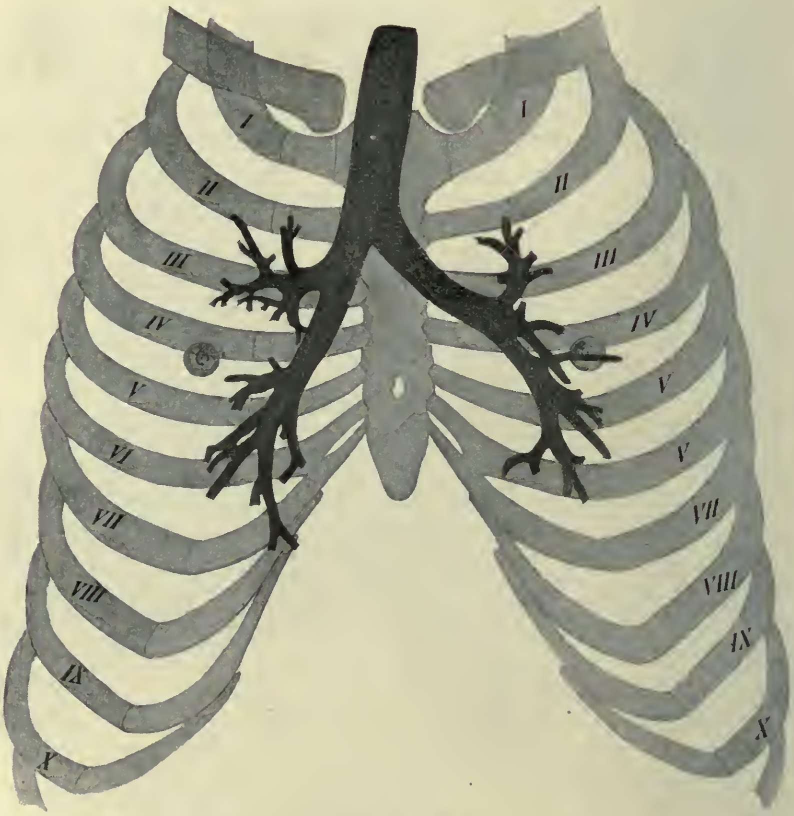


Diagram of Fig. 4.

In children the point of commencement of the bronchi, as before stated, is opposite the third chondro-sternal articulation; otherwise the course is the same as in the adult, due allowance being made in the distance of their termination from the vertebral spines posteriorly. In comparing the direction of the two bronchial trunks the right is seen to correspond very closely with that of the trachea, while the left diverges markedly.

The relations of the first branches of the stem bronchi are approximately as follows, their position in regard to the chest-wall being influenced by the same factors which affect the position of the tracheal bifurcation.

The eparterial bronchus is given off at the level of the lower part of the second interspace or the third cartilage anteriorly, and at the level of the fifth space or sixth rib posteriorly. The first branch from the left bronchus is given off at the level of the third space or fourth cartilage anteriorly, and at the level of the sixth interspace or seventh rib posteriorly.

On account of the double course of the left bronchus the point of origin of the first branch is slightly lateral to the line of general direction of the stem bronchus as given, but on the right side the origin of the eparterial branch may be designated by the intersection of the line of general direction of the stem bronchus with the level given. These points may also be determined by measurements, the eparterial bronchus arising one inch, the first branch from the left bronchus two inches, from the tracheal bifurcation.

The points of origin of the first branches on the two sides differ greatly as to their distance from the median line, being anteriorly on the left side in the parasternal line, on the right midway between the sternal and parasternal lines; while posteriorly the point of origin of the eparterial bronchus is at the right border of the vertebral column, that of the first branch from the left bronchus being two and a half inches from the spines of the vertebræ.

HEMIATROPHY OF THE BRAIN WITHOUT DISTURBANCES OF INTELLIGENCE OR PERSONALITY.[1]

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The following case has been deemed worthy of record on account of its unique character and because it has important bearings upon the localization of psychic functions.

The patient, a carpenter, aged fifty-seven years at the time of his death, was, according to his own statement, strong and well up to the age of forty-seven years. He denied having had the symptoms of syphilis, and said he had not been an excessive drinker. These statements were corroborated after his death. He was married, had several children, and supported his family by his daily labor. When forty-seven years of age or thereabouts he awoke one morning to find the whole left side numb and powerless. The ordinarily severe cerebral symptoms of apoplexy were absent, but the paralysis was complete, so that the face was drawn to the right and the left arm and leg were entirely useless. The face gradually improved; the arm and leg soon began to "stiffen up," but there was little or no return of voluntary power over them, the patient remaining almost absolutely crippled on the left side.

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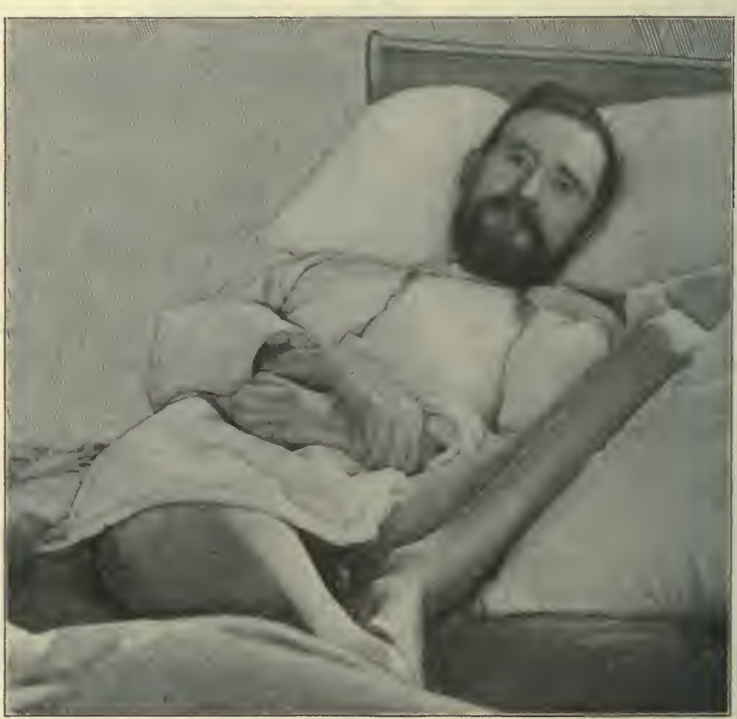
[1] From the Department of Pathology of the College of Physicians and Surgeons, Columbia University, New York.

FIG. 1.



Six years after the stroke, having had a variety of hospital experiences, the patient was admitted to the almshouse. For the three years preceding his death he was under my constant observation in the wards of the Hospital for Incurables. With the exception of the face, the paralysis of which had to a great extent receded, he presented the most pronounced type of hemiplegia with contracture imaginable. (Fig. 1.) The toes were bent over on the sole of the foot; the ankle was extended; the flexion at the knee- and hip-joints was so extreme that the posterior surface of the leg touched the thigh, and the anterior surface of the thigh touched the abdomen. The deformities in the upper extremities were of the same character, though less in degree. All the contractures were rigid in the extreme. Without causing the patient great pain it was impossible to effect over a few degrees of movement in the joints. Division of the hamstring tendons had been done without benefit; mechanical contrivances caused so much suffering that they had to be abandoned.

The paralysis with contracture was the chief physical symptom; there were no defects in sphincter action or in special sense function. The patient complained somewhat of feelings of numbness in the left side, but objective anæsthesia was not demonstrable.

The paralyzed limbs were wasted to a certain extent, but not more than is usual in cerebral palsies. They were not shortened. The tendon-reflexes on the hemiplegic side could not be elicited on account of the contractures. On the other side they were exaggerated.

In contrast to these pronounced physical symptoms, pointing to an extensive lesion in the right half of the brain, was the absence of disturbances referable to the psychic faculties. Speech was perfectly normal; reading was not interfered with; memory was apparently unaffected. Although, unfortunately, no systematic examination of the higher mental attributes was made, I never noticed, in my frequent conversations with the patient during the three years, nor was there ever reported to me by the house-staff or attendants, anything to indicate that the man's character or mental capacity had been affected in any way by the cerebral affection. He was courteous, intelligent, and patient; he was cheerful and attentive, and his power of attention was very good; he read the papers constantly, liked to talk politics, and was interested in the affairs of the hospital. Fully conscious of his infirmity, he bore it bravely. He was singularly free from the periods of depression, of emotional excitement, of irritability, of apathy, or of any other of the manifestations of abnormal mental states so common in gross brain lesions. He was cleanly, and required only such care as his physical infirmity rendered necessary.

In the summer of 1897 he was taken with symptoms of pneumonia, and after an illness of a few days' duration he died. The autopsy showed atheromatous degenerations in the heart and aorta, the gross lesions of chronic diffuse nephritis, and a lobar pneumonia.

Brain. The dura was moderately thickened, especially over the anterior part of the right hemisphere. In this region—the frontal—there was beneath the dura a soft, fluctuating area, which proved to be a cyst in the meshes of the pia. When the dura was removed the covering of the cyst was torn away and a straw-colored serous fluid exuded. The cyst was 6 cm. in diameter.

The left hemisphere was normal in size and in the configuration of the convolutions. The right hemisphere (Figs. 2 and 3), however, was greatly shrunken. The portion of it posterior to the fissure of Rolando was atrophied in the individual convolutions, but the convolutions retained their normal topography.

The region anterior to this fissure, and comprising all the frontal lobes excepting that part lying just to the inner side of the olfactory tract (gyrus, rectus, Quain) and the upper half of the precentral gyrus, was occupied by a yellowish-white, semitranslucent, œdematous tissue, overlying a soft mass as a membrane. This mass and its membranous covering, looked at from the side, had an irregular, quadrilateral shape, and measured approximately 3 cm. in length, 4 cm. in breadth, and 1½ to 2 cm. in thickness. Its surface was very uneven, presenting elevations and depressions in such wise as to suggest diminutive convolutions. On section it was found to be dirty white and fibrous, somewhat more resistant than brain tissue, and showing no gray matter.

Thus the macroscopic appearance of the right hemisphere presented, posterior to the fissura centralis, a slight atrophy of the brain substance; while anterior to it nearly the whole frontal region was represented by a shapeless mass.

FIG. 2.

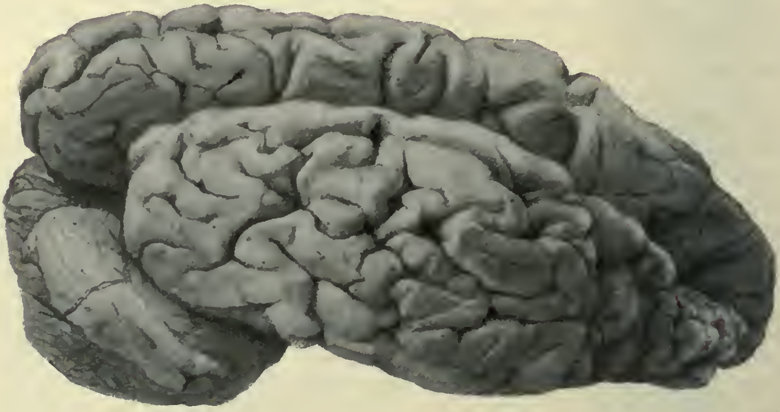
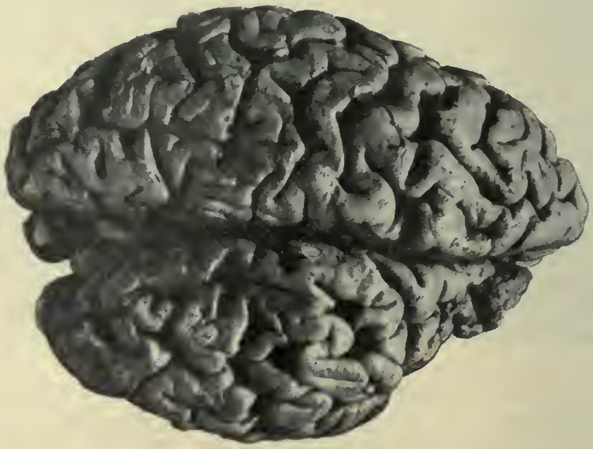


FIG. 3.



Hemiatrophy was also found in the lower-lying segments of the cerebrospinal axis, with the exception of the cerebellum. Both cerebellar hemispheres were of the same size. But the basal ganglia of the right side were atrophic in the extreme; the right half of the pons was fully one-half smaller than the left half; the difference in the two halves of the medulla, while not so marked as in the pons, was very noticeable. Below the pyramidal crossing the atrophy crossed, being found in the left half of the spinal cord, where it affected both gray and white matter in the whole long axis of the cord.

The anterior commissure of the brain could not be made out; but the middle and posterior commissures seemed normal, as did the cranial nerves.

The bloodvessels at the base of the brain were atheromatous and thickened. No further pathological changes were noticed in the arteries supplying the left hemisphere. On the right side, however, the internal carotid, the middle cerebral, and the anterior cerebral as far as its junction with the anterior communicating, were so much diminished in size as to look like fibrous cords. Their lumen was almost entirely obliterated, that of the internal carotid measuring only ½ mm. in diameter. The anterior cerebral artery, after its anastomosis with the anterior communicating, regained its normal size; hence the preservation of the gyrus rectus above described as persisting. The cerebellar arteries, both anterior and posterior, were normal.

Microscopical Examination. Pieces from the mass occupying the position of the frontal lobes on the right side, and from various parts of the cortex of both hemispheres, were examined microscopically according to the Nissl method. The membrane covering the mass proved to be the thickened pia. The mass itself consisted of connective-tissue cells and fibres and of a very friable, amorphous matter, which contained blood-pigment; but there were no traces of ganglion cells recognizable as such. In the left hemisphere the ganglion cells from the frontal region, from the anterior and posterior central, from the parietal lobules, and from the cuneus, seemed normal in number and arrangement. They showed only such slight changes in appearance as are generally demonstrable by the Nissl method when death has been due to pneumonia. In the right hemisphere, however, the cortex was in great part bereft of its cellular elements. Most of the ganglion cells which could be identified as such were greatly reduced in size, all were defective in their staining properties, and only a few retained the normal arrangement of nucleus and Nissl bodies, such as was retained on the left side. The large, pyramidal cells were almost totally absent. There was a considerable number of small, homogeneous masses, which were interpreted as remnants of ganglion cells, but even if these were counted with the ganglion cells which were recognizable as such, the number of ganglion elements would still be very much below normal. The disappearance of the cortical cells was most pronounced in the upper part of the precentral convolution. In the posterior regions of the cortex more cells were present, but even the cuneus of the right side, as compared with that of the left, was strikingly deficient. Further examination with the microscope showed an obliterating endarteritis of the cerebral bloodvessels. In the right internal carotid and right internal cerebral this was particularly severe, so that the lumen of these vessels was almost obliterated. There was a descending degeneration in the spinal pyramidal tract on the left side, and a generalized diminution in volume of the whole left half of the cord. Putting all these facts together, we have the following: A presumably previously active man becomes hemiplegic on the left side. Useful recovery in the limbs does not occur, but the man manifests nothing to indicate that the power or operations of the mind have been affected. Yet, after death, the whole of one hemisphere is found to be greatly lessened in size and impoverished in cellular constituents, and the frontal lobes, which are regarded as the seat of the highest cerebral functions, are almost totally annihilated on one side. The lesion was undoubtedly acquired, and its production can best be explained by assuming a thrombosis or embolism in the right internal carotid artery.

The feature of greatest interest in this case is the destruction of the frontal region of one side without any mental deterioration. In the rest of the corresponding hemisphere, ganglion cells, though changed in size and number, persisted, and it is impossible to say how seriously their functionating power was interfered with. But the frontal region, with the exception of parts of two small lobules, had unquestionably been deprived of all usefulness.

There is considerable experimental and clinical evidence in favor of the hypothesis that the frontal lobes have important synthetizing functions; that in them are gathered up and co-ordinated the results of activity in other parts of the brain; that they are an important central station; that when they are destroyed the individual's "psychical personality" becomes defective. This has been well enunciated by Bianchi,[1] who says, in the conclusions drawn from a series of very careful experiments carried out on dogs and monkeys:

"My hypothesis is that the frontal lobes are the seat of co-ordination and fusion of the incoming and outgoing products of the several sensory and motor areas of the cortex. . . . They would thus sum up into series the products of the sensorimotor regions, as well as the emotive states which accompany all the perceptions, the fusion of which constitutes what has been called the psychical tone of the individual."

In clinical cases, lesions in the frontal region have been especially noted as causing mental apathy or stupidity and changes in character. Williamson,[2] in an analysis of fifty cases of tumors of the prefrontal region, found in thirty-two, or 64 per cent., "a condition of mental decadence, loss of power of attention and loss of memory, loss of spontaneity; the patient takes no notice of his surroundings, sleeping during the greater part of the day or being semi-comatose."

Jastrowitz[3] proposed the term *Moria* as a designation for these peculiar character changes which he regarded as highly suggestive if not pathognomonic of frontal lesions.

Oppenheim supplemented this with "Witzelsucht," or the tendency to make jokes (usually bad ones), which he observed in these cases. This symptom was observed in lesions both of the right and left side; and indeed Oppenhiem[4] has since found it in a case of brain tumor in which the tumor was in the temporal lobes.

The evidence that the character changes of frontal lesions are more constant, depending upon whether the lesions are right- or left-sided, is contradictory. Seguin noticed that they were more frequent in left hemiplegias—*i. e.*, in right-sided lesions. Phelps[1] analyzed twenty-eight cases of laceration of the frontal lobes confirmed by autopsy. The laceration involved the left frontal lobe in eleven, the right in seven, and both lobes in ten. He says:

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[1] Brain, xviii. p. 591.

[2] Brain, xix. p. 346.

[3] Deutsche med. Wochenschrift, 1888.

[4] Die Geschwülste des Nervensystems. Nothnagel's System.

"In the eleven cases in which the laceration was confined to the left lobe there was mental aberration or deficiency, apart from mere stupor or delirium, in every one; while in the seven in which the laceration was confined to the right lobe it was observed in none. In the ten cases in which frontal laceration involved both lobes . . . specific mental disturbance . . . was observed in eight."

Bianchi noticed no mental disturbances when one side of the frontal region was left undisturbed. The case which I have reported shows that the frontal lobes of one side (the right) may be totally destroyed without evident disturbances of mentality or changes in character. The possibility suggests itself that the peculiar synthetizing function of the frontal lobes is to be sought exclusively neither on the right side nor the left, but that it is bilateral; that, under certain circumstances, this function can be assumed and successfully carried out by the lobes of one side only.

[1] Traumatic Injuries of the Brain, New York, 1897.

REVIEWS.

Diseases of Women: A Treatise on the Principles and Practice of Gynecology, for Students and Practitioners. By E. C. Dudley, A.M., M.D., Professor of Gynecology, Northwestern University Medical School; Gynecologist to St. Luke's Hospital, Chicago. With 422 illustrations, of which 47 are in colors, and 2 colored plates. Pp. 637. Philadelphia and New York: Lea Brothers & Co., 1898.

Medical literature is experiencing a return to books by one author and in single volume. The many systems which have been extensively published possess advantages and disadvantages, and have had an abundant opportunity. Students and practitioners welcome the single volume by one author because it is more coherent than a partnership book. It possesses the attractiveness of personality, while its teaching is almost invariably more direct and concise. Systems must always be valuable for reference, as in each several sections are always more valuable than others, and these are monographs which must be frequently consulted; but the working physician and the student naturally use the smaller book.

Before the appearance of Penrose's *Gynecology* there was no modern and complete book by one American author upon this subject. There was abundant room for a book by an author thoroughly taught in the older school and yet well up in the newer knowledge upon this subject. Dr. Dudley's training and experience have fitted him admirably for the task he undertook.

He has produced an original, interesting, and thoroughly scientific book upon this subject, and one well illustrated. While the book is designed to be a practical treatise, and certainly is such, it is founded upon pathology. In the matter of sequence, he has endeavored to pay due attention to etiology. Some of the conditions usually treated of as diseases are clearly described as symptoms only. For example, he discusses metritis in close association with infection of the entire genital tract rather than as a distinct and independent lesion. Displacements of the uterus result from inflammation, tumors, and traumatism, and hence are placed after them. The illustrations are excellent, many of them from orgiual drawings which show clearly what the author intends.

The first section of the book is devoted to general principles. The author first treats of the physiological periods in the life of woman and draws attention to the fact that the common observation that uncivilized woman is stronger than her civilized sister is a fallacy. The educated woman could, if necessary, "resume the march" after parturition, as proved by some notable examples in history. While the savage woman is old and withered at thirty, the high-class civilized woman preserves something of youth until after the age of fifty.

In Chapter II. the writer discusses antiseptic methods and antisepsis. A brief but clear review of the bacteriology necessary for a practical understanding of the subject is given, and there are illustrations of apparatus and many practical hints of decided value. He pays full attention to asepsis of minor manipulations, and closes his chapter with a word of caution or protest against infection from meddlesome office gynecology.

His description of diagnosis is complete and thorough and abundantly illustrated.

Local treatment is then considered, and minor operations are described in detail, and with especial clearness the methods of plastic surgery devised by Emmet. We are a little surprised to find included in this book an account of dilatation of the uterus by means of tents. We had supposed that dilatation by gauze packing, by graduated sounds, or by some sort of glove stretcher dilator had rendered unnecessary the use of tents. In describing the curette several forms of instruments are illustrated, some of which, in our experience, are very undesirable. The sharp spoon curette perforated for continuous irrigation is not mentioned. This, however, we believe to be the best instrument for this purpose.

A full discussion of major operations comes next in order. The writer considers the subject of drainage so important that he has given it a chapter, and his views upon the question of drainage are summarized by the terse statement, "when in doubt, don't drain." The after-treatment of these cases receives adequate attention.

A separate chapter upon the relation of dress to the diseases of women completes Part I. of this volume.

In Part II. the writer discusses inflammation, and this is an excellent chapter upon a subject often treated in an obscure manner. The distinction between infection and inflammation is clearly drawn, and the important part which chronic vices in the nutritive process play is well set forth.

Inflammation of the uterus is certainly one of the most important subjects dealt with in a book of this character. The writer devotes one chapter to general considerations and then treats of acute metritis. His previous chapters upon inflammation and his very clear descriptions of pathological processes in the vagina have prepared the way for this very important topic. He urges the thorough use of the sharp curette where curetting is indicated. He adds, however, a wise caution against the performance of this dangerous operation in an acute case. In chronic metritis and chronic endocervicitis he describes the appropriate operative measures necessary for these conditions. He advises Schroeder's operation for chronic endocervicitis.

Chronic endometritis is discussed at length. A great and appropriate importance is placed upon the systemic condition of the patient. Excellent advice is given regarding her treatment.

Most important, however, is the author's warning regarding topical treatment. He states that he has for years used the vaginal douche, the swabbing out of the uterus with cotton, the injection of astringents, the vaginal and intra-uterine applications of dry powders, intra-uterine pencils of various alterative and caustic substances, wool-glycerin tamponade, electricity, and intra-uterine gauze tamponade. In his hands the diligent and patient use of such means has given much disappointment, to say nothing of some positive harm. In his opinion, "a reproach will be lifted from the medical profession when its indiscriminate use shall have been relegated to the dark ages of gynecology." He draws attention to the danger of using the sound. This subject is brought to a conclusion by a chapter upon the chronic inflammations of the uterine muscle.

Next in order the writer considers pelvic inflammation. He discusses pelvic cellulitis under that name, because he believes that the pelvis contains cellular tissue which frequently becomes diseased. This naturally leads in the following chapter to the description of inflammation of the uterine appendages, including pelvic peritonitis. Especial attention is paid to diagnosis; the non-operative as well as the operative treatment receives full attention.

The writer proceeds to treat disorders of the urethra, bladder, and pelvis of the kidney in a clearly written chapter which embodies the result of the most recent work upon this subject.

In Part III. are treated tumors, tubal pregnancy, and malformations. An excellent description is given of uterine myomata, reinforced by several valuable illustrations. In the matter of treatment, to which a separate chapter is devoted, the author finds that ergot is valuable chiefly during menstruation to control hemorrhage and preserve the vitality of the patient until relief may come with the menopause or the surgical removal of the tumor. For profuse hemorrhage he prefers intrauterine tamponade with a continuous strip of aseptic gauze. Although he has faithfully tried the electrical treatment of myomata, he reaches the conclusion that the survival of the electrical method depends chiefly upon the patient's ignorance of its inadequacy and dangers, upon her worship of the mysterious, upon an unreasoning dread of operative measures, and upon a desire to grasp any other promising means of relief. This sentence expresses admirably, we think, the view held by the majority of those who treat disorders of women.

As regards surgical treatment, the writer has little confidence in ligature of the uterine arteries and broad ligaments. The authors of this method, he observes, preserve of late an ominous silence upon this subject. Removal of the ovaries and Fallopian tubes for myomata has become an obsolete operation, in his opinion. He prefers radical vaginal operations when the tumor is readily accessible by that route, and believes that the operation of traction and morcellation will become more and more the choice of operations in place of hysterectomy. He warns against this procedure, however, when the case is complicated by tubal abscess. He has suggested an improvement in gaining access to these tumors for their removal; a circular incision in front of the uterus separating the vaginal wall from the cervix, followed by division of the anterior vaginal wall and the anterior wall of the uterus longitudinally in the median line, to gain access to the tumor. For this procedure he claims distinct advantage over lateral incisions of the cervix. So far as the treatment of the stump is concerned in hysterectomy, he recognizes the intraperitoneal treatment as the established method, and gives credit to Baer, Eastman, and others for their work in this field. In case of a large tumor he has had success in preserving the uterus by opening it after abdominal section, removing the tumor, packing the uterus and vagina with gauze, and closing the uterus by layers of suture.

A short chapter is devoted to benign adenoma, and then carcinoma is taken up. As regards the treatment of this condition, he believes hysterectomy is indicated if the uterus is normally mobile, if no enlarged glands in the parametria are present, and if the vaginal walls are not involved. He gives a full description of vaginal hysterectomy, with some very good illustrations.

In the portion of the book devoted to sarcoma is included a brief but clear account of our present knowledge regarding deciduoma malignum. In the discussion of ovarian tumors he writes fully and clearly upon the secondary changes in these tumors and diagnosis and treatment by operation, urging timely ovariotomy for ovarian tumors complicating pregnancy. He believes that all ectopic pregnancies are primarily tubal, and that the causation of this condition is as yet a matter of speculation. He finds that in tubal pregnancy the tubal mucosa plays a very insignificant part, the placenta being almost entirely derived from the embryo. He denies the old notion that a free embryo could escape and engraft itself upon the peritoneum.

Part IV. is devoted to traumatisms, and laceration of the perineum and perineal region is taken up extensively. He gives an illustration of the proper site for episiotomy, which does not agree with the teaching of many text-books upon obstetrics. He believes that the recto-vesical fascia is sufficient, when intact, to support the pelvic organs. He writes fully of perineorrhaphy and contributes a series of diagrams illustrating his views. He urges the operation of Emmet, using silk-worm-gut as suture and placing the ends of the sutures within the vagina after operation. The illustrations of this portion of the book are excellent, and the whole description is one of the best which we have ever seen.

It is natural to expect that in treating laceration of the cervix uteri and its results the well-known procedure of Emmet should receive full description. The author, however, does not content himself with simple closure of the cervix, but curettes the uterus first, then closing the cervix. Is it not possible that much of the benefit derived from the two procedures in cases in which the cervical laceration is not extensive may be caused by the curetting? The writer agrees with those obstetricians who urge immediate closure of the torn cervix after labor when profuse hemorrhage is present. He is inclined to doubt whether accurate approximation can be made in these cases and whether it is not better to wait until the patient has recovered from labor. We cannot agree with him in this, as in hospital work we have for several years instructed our assistants to close all considerable tears of the cervix by suture. In the great majority of these patients satisfactory union has followed. In some cases we have used the continuous catgut suture, and in others the interrupted suture with chromicized catgut.

In treating of vesico-vaginal fistula the fact is emphasized that it is not the proper use of obstetric forceps which causes this injury, but the neglect to employ it in proper cases. Failure to empty the bladder by catheter at frequent intervals during prolonged labor is also a cause of this complication. In describing the surgical treatment of this condition the writer urges the importance of preparatory treatment, and lays down the rule that, when the parts are in a healthy condition and all phosphatic deposits have been removed, suture should never be introduced unless the surfaces to be united can be held in contact without traction. If such be not the case, the plan of operation must be so modified that traction is completely avoided. He illustrates the correct method of denudation and also the incorrect, borrowing for the latter purpose a cut taken from a standard work. Other forms of genital fistulæ receive careful attention.

The author divides displacements of the uterus into those of location and those of position. He gives precise directions for making a diagnosis in these cases. In treating of prolapse he emphasizes the fact that elongation of the cervix seldom exists in these cases, but that the condition present is one of temporary engorgement, which disappears when the womb is replaced. He urges, in puerperal cases, the replacement of the uterus, if necessary, before the patient leaves her bed. An operation original with the author, known as lateral elytrorrhaphy, is described for the relief of prolapse, and the results thus obtained have been satisfactory to the writer.

In treating of retroversion and retroflexion the author urges the value of pelvic massage in suitable cases. He believes that the ordinary retroversion pessary should be inserted transversely in the vagina, and not, as is usually done, in the antero-posterior axis of the vaginal outlet. He illustrates clearly the wrong and the right method of this common manipulation. While the properly adjusted pessary gives the patient no consciousness of its presence, its dangers in inefficient hands are in striking contrast with its usefulness. The operative treatment of backward displacements is fully considered, and in cases where pregnancy may occur vaginal fixation of the uterus should not be employed. The field for Alexander's operation is a limited one, the preference being given to abdominal hysterorrhaphy. The author also describes an original operation for marked anteflexion, and illustrates it fully. It consists in incising the lips of the cervix, excising wedge-shaped portions, and so bringing the parts together as to straighten the canal. His experience numbers about fifty cases, with 100 per cent. of anatomical cures and 75 per cent. of symptomatic cures. He concludes this portion of the book by a chapter upon inversion of the uterus. The volume is brought to a close by an elaborate chapter upon pelvic massage, fully illustrated. The writer does not consider it a panacea, but a rational therapeutic agent for the relief of many conditions for which there is no other equally good remedy.

In concluding our review of this volume we have been impressed with the strong effort made by the author to treat his subject from the standpoint of modern medical science. As the science of pathology has advanced so remarkably, it has made modern medicine largely a pathological study. The writer's classification of the conditions treated of in his book will not be acceptable to many readers. It is at first unfamiliar, and we miss old acquaintances in accustomed places; but if we are to write in accordance with the latest and best knowledge obtainable, then some such arrangement of text-books as that in the present volume must inevitably be adopted. We believe the arrangement a good one, and that it will greatly enhance to the student and practitioner the value of the book.

A striking feature of the work is its originality. Not only is the arrangement original, but operative and other procedures which the author has published in papers previously are embodied in this work. It has also the decided merit of clear, logical, and positive statement, and gives no uncertain tone regarding the choice of methods of treatment. While the author shows loyal allegiance to the work of the past, he is distinctly in the line of advance in all reputed methods in this branch of medicine. This book is a thoroughly modern text-book of striking value and a distinct acquisition to the literature of the subject. E. P. D.

TRAUMATIC SEPARATION OF THE EPIPHYSES. With a Skiagraphic Atlas, Reproducing the Skiagrams Showing the Ossification of the Bones of the Hand and Wrist. By JOHN POLAND, F.R.C.S. London: Smith, Elder & Co. (Imported by G. P. Putnam's Sons, New York), 1898.

IT is not too much to say that this work contains all that is known upon the subject of which it treats. It is not, however, merely an elaborate collection of cases or a compilation of the opinions of others, but in addition has the great merit of embodying much original work by the author upon the basis of the Röntgen rays, some of the results of this work being a considerable modification of views hitherto held as to the evolution of the ossification of some parts of the skeleton. After an elaborate historical introduction and a most interesting chapter on the anatomy and connections of the epiphyses, the general subject of epiphyseal separation is considered from various stand-points.

As to *etiology*, the general rule is advanced that, taken as a whole, the causes which produce these lesions are the same as those of fracture, but as a rule they are more severe. An injury which would be sufficient to produce a dislocation in an adult will in the child produce a separation of the epiphysis; epiphyseal separation in the child may indeed be called the analogue of dislocation in the adult. Of course, a lesser degree of violence applied to an epiphysis in a young subject with some constitutional affection is often sufficient to cause its separation without producing any displacement.

Emphasis is placed upon the importance of lesions of the juxta-epiphyseal regions in young children often following directly upon violent movements. Although not apparent from the outside, they are yet important lesions, since they are the immediate or remote cause of various inflammations of the bones or joints. Such lesions are of especial importance in children predisposed to tubercle or who have suffered from septic poisoning. Many of the pains called "growing pains" are due to juxta-epiphyseal sprains or injury. A juxta-epiphyseal sprain is often nothing but the first degree of an epiphyseal separation, in the same way that an articular sprain is nothing but the first degree of dislocation.

As to *frequency*, from statistics the author has given in each chapter it is clearly proved that these accidents are less common in early childhood than after the age of eleven or twelve. This is contrary to what has commonly been conjectured by former writers, viz., that young children are most frequently affected with traumatic epiphyseal separations. The belief probably arose from the fact that the epiphyses at this early age are considerably larger in proportion to the diaphyses and less strongly united to them than they are at a later period. In reality, the period from eleven or twelve to eighteen years of age is the one in which these injuries are most likely to be met with, which fact is largely due to the circumstance that children at this age are more exposed to severe injuries such as are likely to cause epiphyseal separations.

As to *sex*, the extraordinary preponderance of males, which has long been known, is shown by the author's figures to be even greater than has been supposed. Out of the total number of cases (345) the sex is stated in 289 as 247 males and 42 females, all except three of the latter being at or below the age of puberty. After puberty, probably on account of the greatly diminished exposure to violence in games, plays, etc., traumatic separation of the epiphyses is almost unknown in females. The estimate of the relative frequency with which the different epiphyses suffer from this accident is of interest, but cannot be regarded as of permanent value until a larger number of cases have been accurately observed and recorded.

Mr. Poland says that "from practical experience one is led to the belief that separations of the lower end of the humerus in their various complicated forms are perhaps the most frequent.

"The epiphyses of the upper limbs are much more often involved than those of the lower. The author's figures are 426 in the upper extremity and 267 in the lower extremity."

After the lower epiphysis of the femur the lower epiphysis of the radius stands next in order of frequency in the number of specimens that can be shown, whereas at the upper end of the humerus there are few specimens compared with clinical cases. The fallacy lies in the fact that at the lower end of the femur the injury is more frequently followed by serious complications, amputation, or death.

The chapter on *pathology* deals with the varying character of the separations and with the associated lesions. After examining the museum specimens of epiphyseal separation contained in the London hospitals and the recorded cases of compound separation in which the condition of the separated fragments could be clearly seen, the author came to the conclusion that as a bone approaches a certain period in its development the traumatic separation would be of a more simple character. "In each long bone there is a *certain period* peculiar to its epiphyseal ends in which traumatic separation of the epiphysis is of a pure character, uncomplicated by fracture; *below this period*, but more especially *above*, the liability of the separation being accompanied by racture becomes manifest."

In numerous experiments on the dead subject the author arrived at a precisely similar conclusion with regard to all the epiphyses of the long bones. A period is reached in each end of a bone when the epiphysis is fairly ossified and developed, and likewise the end of the diaphysis, leaving a weak point along the epiphyseal line of cartilage. The separation is then a pure one. When, however, the epiphysis is approaching the time of its complete union with the diaphysis, the separation will most probably be accompanied by a fracture of a portion of the diaphysis.

The summary of the *symptoms* and the *diagnostic points* of these injuries will bear some quotation. Mr. Poland begins by saying that "in their symptoms epiphyseal separations have more resemblance to dislocations than fractures." He adds: "The only symptom upon which reliance can be placed is the existence of unnatural mobility in the bone at the point where anatomy informs us the epiphysis is united to the shaft, in the immediate neighborhood of the conjugal cartilage, always recollecting that this line in the same bone alters its position in the different periods of infancy and puberty. This mobility of a limb after obstetrical manipulations or rough handling of an infant should suggest at once an epiphyseal separation. When the periosteum has been stripped up or lacerated and permits displacement, the mobility will be even more marked and easier of detection in certain cases than in ordinary fractures, by reason of the regularity of the separated surfaces and the absence of all tooth-like projections."

Swelling and ecchymosis have nothing characteristic; but pain as a symptom of separated epiphyses is of great practical use, as it indicates the precise spot where the solution of continuity exists, viz., at the diaphysio-epiphyseal line. It is especially valuable in separations caused by indirect violence or muscular action rather than by direct violence, where there is great contusion and consequently great pain over a considerable area. In fractures near the joints or in separation of the epiphyses the pain is generally greater than in fractures elsewhere.

Deformity may be diagnostic if it is not obscured by swelling. The anatomical knowledge of the surgeon will lead him to recognize the shape of the displaced epiphyses or of the projecting edge of the end of the diaphysis.

The *prognosis*, as regards the subsequent growth of the bone after separation of its epiphyses, is of the greatest importance to the practical surgeon. This growth is not of necessity interfered with, because the epiphyseal cartilage performs its function in many cases as perfectly as before the injury.

Many instances of dwarfing of the limbs have been recorded as the result of epiphyseal injuries, but the most marked cases have occurred after injury to the upper epiphysis of the humerus. In this instance, as in other epiphyseal separations, the wasting and diminished growth of the limb are in part dependent upon the loss of the natural function or diminution in the use made of it, the result of anchylosis of the joint.

As might have been supposed, arrest of growth occurs most often at the upper epiphysis of the humerus and at the lower epiphyses of the femur, tibia, and radius, by reason of the late period of their union with the diaphyses and their being the most frequent seats of separation.

It is probably true that the reason these injuries are so seldom followed by arrest of growth is that the separation seldom occurs in the conjugal cartilage itself, but rather in the ossifying or ossified, spongy tissue which immediately adjoins the cartilage, and a certain amount of which always clings to the cartilage; again, that these injuries often occur still further toward the diaphysis, viz., in the juxta-epiphyseal spongy tissue.

The general principles of *treatment* do not differ materially from those governing the treatment of fractures near joints; the complications must be met in the same manner; reduction of deformity must be early, and if necessary must be accomplished by operation. Immediate massage is very properly not regarded with much favor.

The remainder, and by far the greater part of the book, is taken up with discussion of the recorded cases, the symptoms, and the treatment of the separations of the special epiphyses. It is by far the most thorough and comprehensive collection of cases yet brought together.

In the main the author's views as to all practical points are well founded and worthy of adoption.

The book is beautifully made, and the illustrations, especially the skiagrams, are admirable. Mr. Poland is to be congratulated on having made a notable addition to surgical literature and as having well and thoroughly met a want which has been recognized for years by practical surgeons, and especially by surgical teachers.

J. W. W.

A CLINICAL TREATISE ON DISEASES OF THE BREAST. By A. MARMADUKE SHEILD, M.D. (Cantab), F.R.C.S. New York: The Macmillan Company, 1898.

SEVERAL eminent surgeons have written upon diseases of the breast (Velpeau, Bryant, Birkett, Williams, the younger Gross), but a thoroughly modern treatise was greatly needed, and one written by such an accomplished surgeon as Marmaduke Sheild is to be warmly welcomed.

This subject is often slighted in our works upon surgery. In one of the most authoritative of modern text-books, a work which consists of three large volumes, the entire subject of diseases of the mammary gland is dismissed in about twenty-five pages. The book before us consists of some 500 pages. It is well illustrated, clearly written, and embodies the great practical experience of a surgeon who has studied this subject long and well. The profession is aware that Mr. Sheild has been for some time investigating these diseases, and our readers will recall his valuable paper upon abscess of the breast (*Lancet*, May 2, 1896) and his important contribution on the diagnosis of cancer (*British Medical Journal*, May 30, 1896). The first chapter of the book before us deals with anatomy and physiology. The author calls particular attention to the fact that the outline of the breast is not sharply defined, but from the gland a number of cusps or processes pass off in different directions. Some of the extensions pass toward the axilla, two or more to the margin of the sternum, and, as Heidenhain pointed out, submammary prolongations may actually pass through the pectoral fascia. In an operation for carcinoma all of these outlying portions must be removed. In describing the lymphatics of the breast he summarizes the well-known views of Stiles, which were published in the *Transactions of the Edinburgh Medical Chirurgical Society*, vol. xi.

The chapter on acute mastitis and abscess is extremely valuable. Sheild believes that a vast majority of abscesses in either sex are due to the entrance of pyogenic organisms through an abrasion and their passage into the lymphatic ducts. Entrance of organisms into the milk ducts he does not regard as a probable cause. In many cases an abrasion cannot be detected by means of the naked eye, but can be discovered if a lens is used. Abscesses in nursing women can be prevented to a great extent by keeping the mother's nipple and the child's mouth clean. The author objects to the incision radiating from the nipple on the upper surface of the gland, which is so usually employed by surgeons. Such an incision produces an unsightly scar, does not afford good drainage, and will not cure the "abcès en bouton de chemise" of Velpeau. Sheild makes a radiating incision on the under surface of the breast, entering the knife at the thoracico-mammary junction.

The chapter on chronic mastitis should be read with care. Cases of chronic mastitis are often confounded with cancer. Some surgeons maintain that cancer can arise from chronic mastitis. We have never thought it probable, and feel strengthened in this view on reading Sheild's statement that reported cases in which this evolution is thought to have taken place were cancerous from the first. If in a case the diagnosis is in doubt our author advises us to apply medical treatment and wait for a time. Mastitis will remain stationary or improve, but cancer will steadily advance. Some surgeons when in doubt always remove the breast. This solution is easy for the surgeon, but is not exactly a satisfactory solution for a conscientious and scientific man. In general mastitis with cyst formation Sheild wisely advises us to remove the breast. The author tells us that Paget's disease can appear on other parts than the nipple. He looks upon it as a superficial epithelioma of the skin, does not think it is ever really cured by local remedies, and maintains that it should be treated by removal of the breast and clearing out of the axilla. The chapter on cancer is extremely valuable and the section on diagnosis is particularly useful. Sheild believes that the modern view as to the necessity for radical operation comes really from Moore's paper, which was published in 1867. It is pleasant to find that the author gives credit to the valuable labors of the younger Gross, who, during many years and in spite of virulent opposition, advocated most forcibly radical operation.

Sheild does not think that we can ever promise cure to a patient, but he is certain that in very many instances we can prevent local recurrences and can prolong the individual's life for several or even many years. The reviewer's experience as to the patient's future is in accord with the views set forth by Sheild, who feels more gloomy as to a patient's future than does Halsted or Cheyne, because he is persuaded that even after three years has passed cancer may appear in some distant part.

Sheild maintains, and we think justly, that the most thorough operations should be performed in early cases, because in early cases there is a chance to cure, and even in early cases the mamma is diseased throughout, and all of its cells show a tendency to reproductive activity. The very small mortality of this large operation is commented on. His operation is radical, but less radical than Halsted's. He does not operate for atrophic scirrhus, for cancer en cuirasse, or if the glands of the neck are involved.

This is a most useful book. In every line it bears the mark of a surgeon who has seen and studied what he speaks of, and whose views are founded on the solid rock of experience. We commend it warmly. We shall keep it in a convenient place in our library, and will constantly refer to it in the future. J. C. DA C.

THE DISEASES OF THE STOMACH. By WILLIAM W. VAN VALZAH, A.M., M.D., and J. DOUGLAS NISBET, A.B., M.D. Illustrated. Pp. 674. Philadelphia: W. B. Saunders, 1898.

THIS joint production of Drs. Van Valzah and Nisbet is written in a scholarly style and undoubtedly possesses what the authors claim as the chief excuse for its existence—individuality, although whether this latter—a feature evident throughout—renders the work the more valuable as a practical text-book for the general physician may be somewhat called into question. So far, however, as concerns the completeness of the book in useful information forcefully presented, it is most praiseworthy. That points for minor criticism exist concerning the exactness of certain diagnostic and therapeutic statements is not surprising, for what treatise on general or special medicine in its first issue is without blemish in this particular? Those that we note are of too little importance to detract from the usefulness of the work or to permit of the consumption of undue space for special notice. One general criticism must be made, that in the endeavors of the authors to approach completeness the work has been rendered so comprehensive as to appear somewhat impracticable. It is a fact that such an amount of unnecessary matter has to be gone over to obtain the gist of a subject as to render the task wearisome to those who may have to consult its pages frequently. It is fortunate that no endeavor was made to enter into historical description or to give the complete literature of modern work in this field. Had this been done the book would have been voluminous indeed. This extreme minuteness is particularly evident in the second section, that on diagnosis and diagnostic methods, which portion we cannot regard as the most valuable in the work. This section, with the third—that on general medication—of real practical value, constitutes the first part of the volume (the first section is merely introductory), and occupies 261 closely printed pages. In the remaining portion the special diseases of the stomach are considered. These sections are well written and practical.

It seems a mistake in a book intended for the general physician to put forward newly coined terms denominating the secretory disorders characterized by heightened and by diminished function. These are already too abundantly named—the one as hyperchlorhydria, hyperchylia, super- or hyperacidity; the other as hypochlorhydria, hypochylia, or subacidity. The authors invariably speak of these as *adenohypersthenia* and *adenoasthenia gastrica*. These terms, although self-explanatory and etymologically exemplary, are unnecessary, and may easily tend, at least momentarily, to confound the reader encountering them as diseases new and unfamiliar throughout the book.

The authors are strongly to be commended that, at the outset, they emphasize a fact too little grasped by the self-styled "gastro-enterological specialist," who, after a course in the special diagnostic manipulative procedures in this branch, becoming fairly skilled in the passage of a stomach-tube and the simpler chemical analytic methods, too often regards himself as now possessing a past-master knowledge of the subject—an error his victims often appreciate earlier than himself. It is truly remarked by the authors "that the diagnosis of a disease of the stomach includes more than a knowledge of the pathological chemistry of digestion. The unhealthy variations of the gastric juice, the perversion of the motor function, the little variations in the quantity of the hydrochloric acid secreted or left free, occupy too much and too exclusively the minds of some practitioners." D. D. S.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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A Case of Acute Diabetes Mellitus.—Böhm (*Münch. med. Wochenschrift*, 1898, No. 36) observed the following interesting case: A youth, aged seventeen years, pupil in a military school, noticed symptoms of malaise and depression, headache, dizziness, increased thirst, and excessive secretion of urine during the Christmas vacation. The father died at forty-three years of age, of dropsy and cancer of the liver; the mother and two brothers were well. Examination on January 13th showed bronchitis with slight elevation of temperature; pallor and emaciation; the urine amounted to 5500 c.c. in twenty-four hours; specific gravity 1030; no albumin, but 4.9 per cent. of sugar. Diet had no evident effect on the urine. On January 17th the patient went into diabetic coma and died at the end of twenty-four hours.

Autopsy revealed œdema of the brain, acute internal hydrocephalus, hypertrophy and dilatation of the heart, bronchitis, subacute parenchymatous and interstitial nephritis, and atrophy of the pancreas (36 grammes in place of 80–100). The alteration in the kidneys showed that the disease was older than the history seemed to indicate, though not, perhaps, very much. Through his increased appetite and good digestion the patient had been able to prevent a loss of weight and appear well at the monthly medical inspection of the school. The atrophy of the pancreas is of great interest.

Tetany in Dilated Stomach Not Always Associated with Ulcer and Hyperchlorhydria.—Sievers (*Berliner klin. Wochenschrift*, 1898, Nos. 31 and 32) reports two cases of tetany which occurred in connection with dilated stomach. Both were fatal, and in both there was stenosis of the pylorus from healed ulcers, and consequent enormous dilatation.

The author has investigated all the reports of fatal cases, twenty-seven in number, in order to control the theory of Bouveret and Devic, according to which tetany is always associated with hypersecretion. In most of the reported cases there was dilatation due to stenosis from the scars of pyloric or duodenal ulcers, or else there was ulcer or scar without stenosis. But in some cases these were not to be found, and in some of these hydrochloric acid was not present during life. In three cases carcinoma had developed in the edge of the healed ulcers. In all these cases the tetany occurred late, when the hydrochloric acid was probably diminished as compared with the earlier period. Sievers explains the coincidence more naturally by pointing out that in stenosis from healed ulcers the most extreme forms of dilatation occur, and, according to the toxic theory, these offer a better opportunity for the toxic substances to form than do the milder cases.

The Heredity of Tuberculosis.—G. Hauser (*Deutsches Archiv für klin. Med*, Band lxi. p. 221) has made an admirable investigation in this subject, both statistical—embracing, however, only French and German reports—and experimental. As the result of the first part of this study he comes to the following conclusions: Hereditary transmission of tuberculosis occurs in men and animals (cows, rabbits, and guinea-pigs) on the mother's side, and the transmission is undoubtedly through the fœtal circulation (eighteen positive cases in human beings are mentioned).

There is not a single instance of hereditary transmission by the father, although there is no doubt that in severe general tuberculosis bacilli are frequently present in the semen.

In almost all cases of hereditary transmission in men and animals the mother is severely, usually fatally, tuberculous. So, too, tubercle bacilli are found in semen only in cases of severe general tuberculosis or tuberculosis of the testes. Even in cases of severe general tuberculosis (not miliary) of the mother not more than 10 per cent. of the offspring have tuberculosis.

These conclusions give no support to the theory of bacillary heredity of tuberculosis, for the following reasons, among others: The fact that the mother only is concerned contrasts strongly with the common observation that the fathers of tuberculous patients are affected almost to the same extent as the mothers. In bacillary inheritance the liver is most frequently affected; the liver and portal lymphatics are, in fact, the organs chiefly affected in 80 per cent. of cases. Yet tuberculosis of the liver is relatively rare at all ages. All the positive observations show merely that tuberculosis acts as any other infectious disease, in which, in severe cases, the mother may transmit the germs to the fœtus. But because this can happen with staphylococci no one would claim that all cases of infection of that kind are inherited. The author explains the theory of Baumgarten from every point of view and with great skill, and that part of it which assumes that the occurrence of tuberculosis of the lymph-glands and joints cannot be explained by external infection is contrasted with the acceptance of still more intricate modes of infection by the Baumgarten school.

Hauser's experiments were made on rabbits and guinea-pigs and extended over four years. No example of undoubted congenital tuberculosis was observed, and there was no evidence that tuberculosis of the parents caused a lessening of the "vital energy" of the descendants, even to the third generation.

The comparisons with syphilis and pebrine are instructive, but need not be given here. Hauser attributes the undeniable hereditary character of tuberculosis to infection due to unusual exposure to the virus and to an inherited predisposition to the tuberculous virus—an unsatisfactory but necessary explanation, which is illustrated by comparisons with premature baldness, dental caries, weakness of the respiratory and digestive organs, and idiosyncrasy to poisons.

Pneumothorax from Gas-forming Bacteria (B. coli).—MAY and GEBHARD (*Deutsches Archiv für klin. Med.*, Band lxiii. p. 323) have observed an example of this process. The subject was a laborer, aged forty-three years, who, after repeatedly stabbing another man, gave himself two wounds in the region of the heart. The wounds healed readily, but the temperature remained high, with evening exacerbations. Later, an effusion formed in the left pleural cavity. It was hemorrhagic and appeared to contain diplococci. Soon the symptoms of pneumothorax appeared, with succussion. The fluid then was hemorrhagic and purulent. On tapping the thorax gas was found, which burned with a pale-bluish flame. A costal resection was made. Still later, a pericardial exudate was discovered, reaching large size, and on opening the pericardium two litres of fluid were evacuated. Two months after the beginning the patient died. Autopsy revealed fibrinopurulent pleurisy and pericarditis, fatty and congested liver, beginning cyanotic induration of the kidneys, and general anasarca.

The discussion of the physical signs is interesting, as there was probably, at an early stage, pneumopericardium masked by the pneumothorax, but the most valuable part of the report is that regarding the formation of the gas. This was found to contain CO_2 and traces of hydrogen and nitrogen. The gas was evidently formed in the body by bacteria, and cultures and experiments proved these to be colon bacilli, which were found in the pleural cavity and pericardium, along with the staphylococcus pyogenes aureus. The course of events was probably as follows: Infection with both organisms simultaneously, hemorrhagic exudate changed to purulent under the influence of the staphylococci, gas-formation by the action of the bacillus coli on the exudate. The authors point out the proofs necessary to show that the gas in a case of pneumothorax is of bacterial origin, viz., that the gas contains substances not found in air, such as H, H_2S, or marsh gas, and bacteria capable of producing the gas.

Treatment of Aortic Aneurism by Injections of Gelatin.—The *Lancet* (October 22, 1898, p. 1092) refers to an important communication of M. LANCEREAUX to the Academy of Medicine on this method of treatment, which had yielded remarkable results in his hands. A solution of 2 grammes of gelatin to 100 grammes of normal salt solution is made, and of this 250 c.c. are injected into the subcutaneous cellular tissue of the thigh. The injection is repeated at varying intervals of from two to fifteen days. Generally speaking, ten, fifteen, or twenty injections are usually sufficient to effect a complete cure. Lancereaux's first case had an aortic aneurism which projected anteriorly and ruptured beneath the skin. Subcutaneous injections of gelatin caused coagulation of the extravasated blood and eventually cure of the aneurism. In his second case there was an aortic aneurism which did not come to the surface. Gelatin injections caused the dilated superficial veins to diminish in volume and all pain to disappear. Lancereaux had treated many aortic aneurisms and one subclavian aneurism with similar results. Two cases with aortitis and dilated aorta had no amelioration of symptoms, and at autopsy there was no clotting of blood in the dilated portion of the artery. M. Huchard had used the method in a severe case and obtained a complete cure after twenty injections, the only inconvenience being that the injections were very painful. He had also employed it with success in a severe case of hæmoptysis in pulmonary tuberculosis. Certain precautions have to be observed in employing the method, as a case of Boisset died suddenly from embolism after an injection. The gelatin must never be injected in the neighborhood of the aneurismal sac nor into the aneurismal sac itself.

HUCHARD (*La Presse Médicale*, October 26, 1898, p. 117) reported before the Académie de Médecine an instance of death following this method of treatment.

The case occurred in the practice of M. Barth. The patient was a woman, aged forty-nine years, who had an aneurism of the ascending portion of the aortic arch. The treatment with iodides failing to give beneficial results, the gelatin injections were tried. They were given three times weekly, and produced a distinct febrile reaction, the temperature reaching 39° C. After five injections a distinct diminution in the pulsation was appreciable. After the sixth injection the temperature rose to 40° C. and a large local abscess developed.

Several days afterward the patient was suddenly seized with a feeling of distress and suffocation, which gradually increased, the case terminating fatally a few hours afterward.

The autopsy revealed an aneurism of the aortic arch. A clot had formed in the sac, reaching 4 cm. in thickness at certain points; it had extended into the large vessels of the neck, the left subclavian being free, however.

He refers to the possible danger in the use of these injections, in that the resulting blood coagulation may be too rapid and too extensive.

To lessen the likelihood of the production of fever and too rapid clotting, Huchard advises a 1 per cent. solution of gelatin in preference to the 2 per cent. solution in normal salt solution advised by Lancereaux.

At the meeting of the Academy of Medicine on October 31st, Laborde explained that the action of the gelatin is entirely mechanical, as small, insoluble particles are absorbed and, reaching the sac, play the rôle of foreign bodies. The risks in the method are by no means imaginary.

The Etiology of Pseudo-croup.—G. ZIMMERMANN (*Münch. med. Wochenschrift*, 1898, No. 29) holds that false croup is a symptom of adenoid vegetations in the pharynx. His attention was called to this by the examination of a patient, a girl of eighteen, in whom the symptoms disappeared on scraping out the growths. In sixteen other cases the suspicion was confirmed, although a careful examination was made in only eleven. Three were examined within half to two hours after an attack. In eight cases the vegetations were the only abnormalities present. In two there was laryngitis, in one rhinitis. The author's explanation of the mechanism is that mucus passes down the larynx, especially during rest in bed, and then causes spasmodic adduction of the false vocal cords, as in pencilling the larynx. A cough, which has a barking character on account of the position of the false vocal cords, frees the opening, but only temporarily. When the cough stops the larynx is closed again, before a deep breath can be taken, and so the symptoms of asphyxia are produced, and it is only in consequence of relaxation of the false cords from CO_2 poisoning that the respiration again becomes free. The subchordal swelling noted by some authors, and assumed to be the cause of the paroxysm, is secondary to the changes described, and is ascribed by Zimmermann to *hyperæmia ex vacuo*. In all cases removal of the vegetations was followed by recovery.

Koplik's Early Diagnostic Sign of Measles.—SLAWYK (*Deutsche med. Wochenschrift*, 1898, No. 17) confirms the observation of Koplik, that early in measles peculiar spots appear on the mucous membrane of the lips and cheeks. He found them present in forty-five cases out of a total fifty-two examined. The spots vary from 0.2 to 0.6 mm. in size, are round, bluish-white, slightly raised, and have a reddish centre about the size of a linseed. (This description differs somewhat from Koplik's.) The number of spots usually varies from six to twenty on each side, but there may be hundreds of them. Occasionally they are unilateral and most abundant in the vicinity of the lower molars. Microscopically they are found to be composed of fatty degenerated buccal epithelium. They are found in no other disease, and as they appear on the first or second day of the prodromal symptoms they constitute a very important early sign.

A Case of Xerostomia, with a Table of Thirty-nine Recorded Cases and Remarks.—A. J. HALL (*The Quarterly Med. Journ.*, 1898, vol. vii. p. 26) reported a case of xerostomia, or chronic dry mouth, which gave the usual clinical history of the disease. In the first volume of the *Edinburgh Hospital Reports*, Prof. Fraser reported a case and gave a summary of the nineteen cases of which he was able to obtain records. Since that date Hall has collected twenty other cases from the literature, making a total of thirty-nine cases in all. In three of these cases Hall had not been able to obtain the details, so that the following statistics comprise only thirty-six cases.

Sex: 32 females, 4 males.

Age: Between twenty and thirty years, 3; between thirty and forty years, 5; between forty and fifty years, 8; over fifty years, 18; age not mentioned in 2.

Parts affected: Mouth and tongue, 36: nose also, 10; eyes also, 7.

State of the skin: Alluded to in only 8 cases. In 2 it was very dry, whilst in all the rest there was more or less marked sweating, and in 3 it was efficient and normal. The conclusion is that the skin is not markedly affected, as a rule.

Duration: It persists usually until the patient dies. In 3 instances death followed the onset of the dryness of the mouth comparatively soon.

Condition of the tongue: In practically all cases in which the condition of the tongue was described, it had been "absolutely dry, smooth, fissured and cracked." The fissures seemed, in most cases, to have been merely smooth epidermis comparable to the healed-over cracks of an old eczema rimosum of the hands.

State of the teeth: Alluded to in only 16 cases. In some of the cases there was a very distinct history of "crumbling away" of the teeth at the onset of the dry mouth.

Reaction of the mouth: Records in only 3 cases. In one it was acid, in a second acid or neutral, and in a third alkaline.

State of the salivary glands and ducts—parotids: In 8 cases the parotids were enlarged, either equally or unequally. In 3 they were described as tender and painful; in 4 they were not so; and in 1 the gland ulcerated through into the mouth. In five cases the enlargement varied from time to time; in one of these the enlargement was most marked at the menstrual period. With one exception the other neighboring salivary glands were not enlarged, although they, as well as the intrinsic glands of the tongue, must be functionally involved to produce the severe grade of dry-mouth.

Mode of onset and supposed cause: In 19 cases reference is made to this point. In 6 the onset was sudden. In 6 cases the cause was attributed to mental shock. It followed influenza or some febrile affection in 4 instances. In 24 cases the cause was "unknown."

The generally prevailing theory as to the cause of these cases is that they are due to defective nerve function, and many show well-marked concomitant symptoms of nervous disturbance. In some cases it seems to be a cessation of function comparable to that which occurs in the ovaries and mammæ, and in such cases would seem to be in no way detrimental to the general health.

PÆDIATRICS.

UNDER THE CHARGE OF

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The Frequency of Typhoid Fever in Infancy.—John Lovett Morse and Hartley Wales Thayer (*Boston Medical and Surgical Journal*, January 12, 1899, p. 36) offer a new contribution to this of late frequently discussed question, availing themselves of the Widal serum reaction as a means of diagnosis. Fifty infants, under two years of age, who were brought to the out-patients' department of the Infants' Hospital, of Boston for diarrhœal diseases were subjected to the test. The day of the disease upon which the blood was taken varied from the third to the fifty-sixth, the majority of the cases being between the fifth and twenty-first days.

In only one case was a positive reaction obtained, and this was in a baby of seven months, first seen on July 12th, the fourth day of illness. It had lost appetite, had abdominal pain, was vomiting frequently, and had six or eight large, watery, greenish, slightly foul movements daily, containing curds, but no mucus or blood. It had been fed at the breast for three months, and then on an uncooked mixture of cow's milk and water. Under treatment the vomiting soon ceased, and the stools were normal in every way on July 21st, the ninth day of treatment and thirteenth day of illness. At no time was there any abdominal tenderness or distention; there were no rose-spots and no splenic enlargement. The temperature ranged between 38° and 39° C. until July 19th, after which it remained normal. A positive serum reaction was obtained on July 12th in fifteen minutes, and another on July 16th in twenty minutes. The mother of this child had a "slow fever" ten years before, since which time she had been in good health. Her blood gave a positive reaction in fifteen minutes on July 16th during her baby's illness.

The question of a previous attack of typhoid fever in the mother was investigated in thirty-nine cases. Thirty-three had not had the disease, while six had had it some time in the past twenty-four, twenty, fifteen, ten, seven, and four years, respectively, the mother of the baby whose case is detailed above being of the number.

If it were not for the positive reaction of the mother's blood this case could only be considered as a case of infantile typhoid. The marked reaction in her, the authors think, suggests the possibility, if not the probability, that the agglutinative power of the serum of the child may have been due to the maternal blood or have been derived from the breast-milk. They conclude that typhoid fever, as is commonly believed, is an unusual disease in infancy; and advance the proposition that it is possible that women whose blood gives a positive reaction, even years after the occurrence of the disease, may in some way transmit this property to the blood of their infants.

Facial Paralysis of Central Origin Due to Faulty Application of the Forceps.—Tissier (*Annales de Médecine et Chirurgie Infantiles*, September 15, 1898, p. 638) reported to the Société d'Obstétrique de Paris the observation of facial palsy in an infant whose head had been injured by three unsuccessful applications of the forceps. The child died, and the reporter was enabled to observe that the scalp had been infiltrated and the brain suffused with blood; but there was no hemorrhagic focus in the brain itself, nor crushing or depression of the skull. The facial nerve was dissected out, and at no point in its course was there hemorrhage or serious pressure. On the paralyzed side the imprint of the forceps was found, but well above the course of the nerve.

Tissier considers that the facial palsy in this case should be attributed to the more or less marked compression of the cranial vault—that is, to an action upon the nerve-centres. This theory, he thinks, explains the rarity of facial paralysis after skilful application of the forceps.

Budin, in discussing the case, questioned the rarity of facial palsy after regular application of the forceps. He had seen it very frequently before the advent of Tarnier's forceps, as had CHARPENTIER, especially in the case of application of the forceps somewhat high up. According to Budin, the mechanism was always the same, the blade of the forceps slipping downward from the head, dragging upon the soft parts, and finally compressing the petrosa, the cutaneous cicatrix being found well below the ear.

A Pad on the Dorsum of the Foot in Rickets.—A. H. TUBBY (*Pediatrics*, January 1, 1899, p. 19) calls attention to the frequent occurrence of a pad-like formation upon the dorsum of the foot, and occasionally upon the hand, which he believes has not been previously described. In these cases the soft tissues upon the dorsum are decidedly thicker than in healthy children, and the swelling may be a flattened elevation or dome-like in appearance. Its color is that often seen in the skin elsewhere in rickets, and may be compared to that which would be produced by the injection of white wax, slightly tinted to a yellowish shade, beneath the skin, so as to give it a distinct tint and a semi-transparent look. While in a healthy child the skin of the dorsum of the foot, if pinched up between the fingers, can be moved independently of the subcutaneous tissue, in many rickety children the skin and subcutaneous tissue are quite inseparable, and only a more or less thick fold composed of both can be made. In many cases it appears as if solid œdema were present in the skin and subcutaneous tissue.

This pad in some cases originates in swelling and thickening in the neighborhood of the epiphyses of the metatarsal bones, hence it is more frequently seen rather toward the anterior than the posterior part of the dorsum. When the bones are so affected, distinct beading may be felt about the epiphyseal lines, and doubtless the perichondrium and periosteum are thickened as well. In early rickets the swelling is often semi-fluid. In cases of a few months' duration it is semi-solid, and in those of more than a year's duration it is hard and resistant.

The author has tabulated 100 cases of rickets, eighty-six of which had dorsal pads. He believes that if cases be watched over a long period of time the pad will be observed to go through the three stages of consistency noted above. At a period of eighteen to thirty-six months after the onset of the disease the subcutaneous pad disappears concurrently with the general flabbiness and undue pallor of the skin, and leaves the bony changes easily apparent to the touch.

The Specific Organism of Vaccinia.—A. F. STANLEY KENT (*Lancet*, December 17, 1898, p. 1616) publishes the results of further studies upon the organism discovered by him in the tissues of the vaccine vesicle in 1894. This was described as a bacillus, exceedingly minute, measuring a bare micron in length; it appeared to occur, as a rule, in pairs, joined so as to form dumb-bells, not true diplococci, the individuals being distinctly, though only slightly, greater in length than in breadth. The minute bacilli occurred not on the surface, or, as far as could be ascertained, among the crowds of foreign organisms in the most superficial parts of the vesicle, but deeply seated, in large numbers and in practically pure culture in their special habitat beneath the line of incision.

The author's later studies have been devoted to elaborating a method of preparing pure cultures of this organism, investigating its staining properties, and conducting inoculation experiments with the cultures. He has thus succeeded in proving that in the organism described as the diplobacillus vacciniæ is found a virus which occurs in the vesicles (and tissues surrounding them) of ordinary vaccinia, exhibiting special morphological characters and staining reactions, and having a special distribution in the tissues. Pure cultures of this organism, when used for inoculation of susceptible animals, give rise to vesicles which are described by experts as being indistinguishable from those produced by current vaccine lymph. Moreover, these animals have been found subsequently to give no reaction when revaccinated with active lymph. Finally, sections through the vesicles so produced are found to contain the organism in large numbers and exhibiting the same morphological characters, staining reaction, and distribution as the organisms originally found in the vesicles of typical vaccinia.

Treatment of Tuberculous Cystitis in Children.—In a thoughtful paper upon "Tuberculous Cystitis in Children," CHARLES GREENE CUMSTON (*Boston Medical and Surgical Journal*, December 22, 1898, p. 619) gives the following outline of treatment. Cod-liver oil, creosote, and tonics are of value, and iodoform in the form of a pill is highly recommended by Guyon and Reverdin. Locally an iodoform or guaiacol emulsion is to be injected into the bladder and retained until expelled. The ulcerations may be cauterized and curetted if they be extensive. Being aware of the favorable results obtained from local applications of lactic acid in tuberculous laryngitis, the author was led to try this agent in the bladder, and the results obtained in the case reported in this paper would appear to indicate that further use of this substance is justifiable.

The indications for suprapubic cystotomy vary according to the end to be obtained. If it is done to bring about a radical cure it should be performed only in cases of primary vesical tuberculosis, and then much can be expected from drainage of the bladder. The ulcerations can be directly cauterized with the thermo-cautery or even excised through the opening. When this operation is done as a palliative measure—that is, when other foci of the disease are present and the cystitis is secondary—the relief from pain is quite enough to justify its performance.

Movable Kidney in Children.—JULES COMBY (*Pediatrics*, November 15, 1898, p. 439) reported to the British Medical Association, at its meeting in July last, that he had encountered eighteen cases of this condition in children in the course of the past several years—so relatively high a number that he is convinced that the condition is common at all ages. Of the eighteen cases two were aged respectively one month and three months; six were between one and ten years; and ten were above ten years of age. These figures, however, corresponded only to the dates of examination and diagnosis, so that the mobility doubtless dated back further than this. Sixteen of the cases were girls, two were boys—the same proportion of the condition in the female sex observed in adult life. In fourteen of the cases the mobility was associated with dyspepsia and dilatation of the stomach;

hereditary syphilis was obvious in two cases; chlorosis in two; lienteric diarrhœa in one; migraine in one, and psoriasis in one. In nearly every case the affection was latent; in two it had been mistaken for a chronic appendicitis; twice it had been recognized and treated. As regards the cause, it was impossible to attribute it to pressure of the corset, as the greater number of the patients wore neither corset nor belt. Nearly all were dyspeptic, having gastric troubles or pains in the stomach, suffering, perhaps, as a result of gastro-intestinal distention, to which ill-nourished children are subject. But in the two subjects of hereditary syphilis, in whom the floating kidney was discovered post mortem, none of the above causes could have been operative, and the affection must here be considered as congenital. Litten, Gutterbock, Ewald, and Albarran believe all cases to be of congenital origin, with which opinion the author seems inclined to agree, at least to the extent of supposing the kidney to be provided with too long a pedicle, which causes it to float in the abdomen either spontaneously or as the result of pressure or injury. The greater liability of females than males to this displacement he thinks must have some connection with the abdominal conformation of the former.

The symptoms are very variable, and do not at any time afford a satisfactory guide to diagnosis; often the affection is absolutely latent. Pain, at times paroxysmal, is sometimes present, and may come on after some unusual fatigue or effort. In these somewhat rare cases the kidney may become twisted and the ureter occluded, causing hydronephrosis, which may be transitory, intermittent, or persistent. Coprostasis, appendicitis, different cystic or solid tumors of the kidney, perinephritis, and stone are among the conditions to be excluded. Palpation usually reveals the presence of a smooth, rounded, movable mass. When the affection is latent or well borne, when the pains are moderate or intermittent in character, rest and an abdominal belt may suffice to relieve. Bandaging rarely succeeds. Dyspepsia and constipation, which are so often present, should not be neglected. Should the pains persist or become unbearable, or attacks of peritonitis or hydronephrosis occur, the operation of nephrorrhaphy should at once be made.

Sarcoma of the Intestine in the Child.—Ablon has collected in his thesis (*Des Fibromes Embryonnaires* (*Sarcomes*) *de l'Intestin chez l'Enfant*, Paris, 1898) ten observations of intestinal sarcoma in childhood, all of which were of the round-celled variety. The disease occurs at all periods of childhood, and may not infrequently be of congenital origin. Its evolution is extraordinarily rapid, terminating fatally usually within two months after its apparent beginning. Heredity was noted in none of the cases, but direct traumatism was mentioned in two instances. The existence of metastatic foci in the viscera has been noted in three-fifths of the cases—in the liver and then in the kidneys most frequently. The development of glandular metastases in regions more or less distant from the primary focus has been noted in equal frequency with the visceral metastasis, but in only one case was there a generalized involvement of the lymphatic glands.

Pathogenesis of Furunculosis in Nurslings.—Friedjung (*Archiv f. Kinderheilkunde*, 1898, Band xxiv. S. 375) has examined bacteriologically nine cases of furunculosis in nurslings, which presented themselves under three varieties: 1. Subepidermic abscess. 2. Furuncles, properly so called. 3. Abscess of the subcutaneous tissue developing almost without inflammatory reaction. In these nine cases, from which fourteen cultures of pus were made, the author found the staphylococcus aureus ten times, three times the same organism associated with a small number of staphylococci albi, and once the latter organism alone. He therefore concludes that the furunculosis of nurslings is a staphylococcic infection of the skin.

As to clinical varieties, he states that in each case in which there was subepidermic abscess there had previously existed a superficial lesion of the skin (varicella, miliaria, eczema, syphilides). On the other hand, previous lesion of the skin was absent in all the cases in which there was furuncle, properly so called, or abscesses developing without reaction.

SURGERY.

UNDER THE CHARGE OF

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Asepsis in Operations.—In discussing the work of Mikulicz in perfecting aseptic technique in operating, QUENU (*Revue de Chir.*, March 10, 1898) says that asepsis is not to be abandoned and a return made to antisepsis, but that the defects in aseptic operating must be discovered and means found for overcoming them.

The employment of gloves in operating produced such marvellous improvement in Mikulicz's results as to render his technique almost perfect.

Quenu has found that ordinary white cotton gloves, such as worn by servants, when sterilized in the usual manner serve all the desired ends. They are not impermeable, and the hands should be rendered as aseptic as possible by the ordinary scrubbing, alcohol, and antiseptic washings. In a short operation one pair of gloves is enough, but if the operation is longer they become soaked through, and one or two changes are necessary. They do not interfere with the ordinary manipulations in operating, and their ready employment is only a matter of habit. The employment of sterilized gauze before the mouth to prevent infection from coughing and speaking is favored by this author.

In his service for the past six years he has never examined a suppurating case the morning before an operation of grave character, such as a laparotomy. His wards are divided for suppurating and non-suppurating cases, and all suppurating cases are operated upon by his assistants. Of course, he is obliged to make rectal and vaginal examinations, but these are never made on a morning preceding a grave operation. Immediately after such examinations the hands are thoroughly scrubbed with soap and water, washed in alcohol, then in permanganate of potassium, followed by bisulphite of soda, and, finally, in alcohol again.

The greatest care is given to the periungual spaces. After thorough sterilization they are painted with tincture of iodine. He agrees with Mikulicz in admitting as few as possible into the operating-room, and does not perform major operations in a large amphitheatre. He also believes that speaking should be avoided as far as is practical during the operation.

The Value of the Laborde Method of Resuscitation in Etherization.—HERZOG (*Deut. Zeitschr. für Chir.*, Bd. xlvii. p. 492), after a series of experiments upon dogs which had been anæsthetized to the point at which respiration ceased, shows that the Laborde method of resuscitation by rhythmical traction upon the tongue is of no value except in the early stages of the anæsthesia.

Hæmostasis Secured by Angiotripsy.—The success reported by Tuffier, which followed his crushing of the lateral ligaments in vaginal hysterectomy, and the use of this method without ligatures or hæmostatic forceps on the arteries, induced AF SCHULTEN, of Helsingfors (*Centralblatt für Chir.*, 1898, No. 29), to attempt the employment of this method upon the lesser vessels in general surgical operations. He found that by using a forceps with stronger jaws than the Péan hæmostat, and longer handles for leverage, he could readily crush arteries that had been picked up, so that ligation was not necessary. The result upon the healing process was all that could be desired. The absence of ligatures decreased irritation; there was no secondary hemorrhage, and primary union followed in all cases except one, in which an intercurrent pneumonia caused the wound to open and heal by granulation. In this case, although no ligatures had been applied, no hemorrhage occurred.

Operation in Lymphadenitis.—VANDERLINDEN (*Annales de la Soc. Belge de Chir.*, August 15, 1898) calls attention to the physiological function of the lymphatic glands, pointing out the fact that they destroy the germs and poisons that enter the system and act as a barrier to their generalization. The question of operative interference is therefore one that involves a judgment of the rôle which they are acting at the time. If they are preventing the dissemination of the poison they should be left and aided in their work by the removal of the original focus of infection. If their vitality and resisting power has, on the other hand, been destroyed so that they act as a nidus for the further development of bacteria, they should be removed. Of course, this reasoning does not apply to cases of malignant infection, in which the infection is a sufficient indication for removal. There are also many circumstances which must enter into the consideration in individual instances. The author cites instances in which the removal of glands undoubtedly led to a rapid dissemination of tubercular disease throughout the system.

The Filling of Cranial Osseous Defects with Charred Bone-plates.—GREKOFF (*Centralblatt für Chir.*, October 1, 1898) has employed in actual practice the method which Barth found valuable in experiments. In the cases of two young children who had, as the result of operation after serious injury, defects in the cranial bones, he used the charred bone with success. In one instance all the plates were not sufficiently charred, and he was obliged to remove some fragments. This gave him the opportunity to observe the actual condition in the remaining plates. He found that the results were all that could be desired, and that the charred plates had been replaced by new, healthy bone.

The function of the charred bone, the author believes, is solely that of a skeleton over which the new bone develops from the adjacent margins of the skull. The cancellated bone is, therefore, most readily penetrated and absorbed, and makes the best plates. In his cases he employed the scapulæ of the calf.

Bier's New Osteoplastic Amputation.—PAYR (*Centralblatt für Chir.*, 1898, No. 19) reports three cases in which this new osteoplastic method of amputation was employed with success, as demonstrated by a skiagraph taken a year after the operation.

The purpose of the method is to unite the extremities of the tibia and fibula by an osteoperiosteal flap, which is derived from the tibia in the following manner:

A musculo-cutaneous flap is formed from either the anterior and external or the anterior and internal aspect of the leg in the ordinary manner. The tibia is freed to a considerable distance below the point at which it is desired to amputate. A transverse incision is then made at a distance below the line of amputation equal to the length of the desired bone-flap. This incision forms the base of a wedge-shaped portion of the tibia, that after removal permits the insertion of a flat saw-blade and the cutting of the osteo-periosteal flap up to the line of amputation. The periosteum is now raised over the line of amputation at the base of the osteoperiosteal flap. A grooved director is passed beneath the periosteum, and with a narrow saw the portion of the bone-flap is removed, which will permit it to bend over without interfering with the circulation on which it depends for its nutrition. When this has been accomplished the flap of bone is turned back and the tibia cut through. The fibula is cut at the same level, and the osteoperiosteal flap is fastened upon the resected ends of the two bones. The wound is closed in the usual manner. Asepsis or the use of only non-irritating antiseptics is essential to the success of this operation. The Röntgen ray picture showed that the osteoperiosteal flap had retained its original thickness throughout, and that it was firmly united to both the tibia and fibula. The functional result attained was all that could be desired.

The Diagnosis of Nephrolithiasis by Röntgen Ray Pictures.—RINGEL (*Centralblatt für Chir.*, December 10, 1898) has followed out the experiments of some of the earlier investigators and has found that the different forms of renal calculi vary in their opacity to the Röntgen rays.

Oxalic-acid calculi are the most opaque, uric-acid calculi are less opaque, while the quality of Röntgen ray he employed readily penetrated the phosphatic calculi and biliary calculi.

Repeating the experiments on the cadaver, his results conincided with those of the earlier observers. The more opaque calculi could be shown, but the less opaque were readily penetrated and could not be detected.

His conclusions are the same as those of the earlier observers, that the positive diagnosis is the only one that can be relied upon, as certain calculi may be present, but cannot be detected.

[This author probably employed a "hard" tube, and in consequence penetrated the less opaque calculi. Clinical experience has recently demonstrated that an absolute diagnosis, both positive and negative, can be made. Sufficient Röntgen discharge can be developed in a "soft" tube of the latest design to penetrate the lumbar region, and yet the quality of the light is such that it will differentiate between the lesser densities, and show all forms of calculi in contrast to the surrounding structures.]

Coxa-vara.—In reporting a case BRUN (*Revue d'Orthopêdie*, November, 1898) says that coxa-vara is revealed by defects in the manner of walking. The child stumbles at every step, especially if be is permitted to walk alone. By careful concentration of the mind upon the walking he is able to correct the defects. The walk is like that of double congenital luxation. The case reported was mistaken for this. The author could not, however, locate the heads of the femora, and in order to be more certain had a radiograph taken. The diagnosis was thus cleared up. The fact which the author would call particularly to notice is that the radiograph has given positive knowledge of the existence of this deformity.

KIRMISSON (*Ibid.*), in discussing the same subject, says that a series of carefully studied and reported cases in which radiographs are employed are essential before the origin of this deformity can be definitely determined. There can be no doubt that there are various causes for it, but the only way to determine what they are is the collection of a large number of cases.

To the causes already enumerated he would add fracture of the neck of the femur, which he believes is less infrequent than has been supposed. It is not possible to make the diagnosis of coxa-vara without the employment of radiographs, no matter what the clinical conditions are that are present in the case.

In making a résumé of his work upon this subject, FABRIKANTE (*Revue de Chir.*, November 10, 1898) says:

1. The affection commonly called coxa-vara is most frequently of rhachitic origin, and is characterized by an incurvation of the neck of the femur.

2. This incurvation may consist (*a*) in a deviation of the neck of the femur downward, with the angle between the neck and the shaft of the femur diminished; (*b*) deviation in advance or backward, with a coincident curve in its longitudinal axis.

3. The greater the curve the less result can be hoped for from orthopedic treatment.

4. In cases requiring operative treatment the preferable thing to do is to remove a wedge-shaped piece from the neck of the femur; its base should be upward.

5. In cases admitting of orthopedic treatment the best method is to employ massage and extension by very small weights, in order to avoid spasms in the muscles.

6. The extension should be employed only during the night. This is not fatiguing for the patient, and does not prevent his getting about during the day.

7. The high shoe is useful only in chronic cases, but it should not be forgotten in treating these cases.

8. The treatment other than local should be carefully directed toward counteracting the rhachitic tendency.

The Importance of the Radiograph in the Diagnosis and Treatment of the Deviations of the Spinal Column.—REDARD and LARAU (*Revue de Chir.*, November, 1898, Supplement) reported to the French Surgical Congress their results in the diagnosis of different forms of deviation of the spinal column by means of skiagraphs. They have found this method of diagnosis very valuable.

In Pott's disease they have demonstrated the foci of disease both in antero-posterior and lateral views. The initial lesions are detected in this manner. In many of their cases this was accomplished very early, and this early diagnosis made it possible to institute treatment at a period before the subjective and objective symptoms were sufficiently marked to make the diagnosis possible by other means.

The radiograph shows how many vertebræ are affected and to what extent. It also shows the extent of the lesions, the loss of substance, the existence of sequestra and tubercular cavities, the degree and cause of the reflection of the thorax. In cases in which the abscess had been treated by iodoform injections the size of the abscess and its shape could be clearly shown.

Radiographs taken at different periods mark the progress or regression of the disease. The results of treatment and the necessity of further interference are clearly demonstrated.

In many instances in which the deformity had been corrected it was seen that the bones had been united in a good position. The union by interfragmentary or peripheral callus of one or more vertebræ was often visible in the negatives. The radiographs have demonstrated, as have anatomical specimens, that in many recent cases a complete cure can be effected.

In cases of scoliosis the deformities can be studied with benefit in this manner. The position and amount of deformity of the individual vertebræ can be carefully noted. The asymmetry or deformities of the vertebral arches can be studied. The callus uniting several vertebræ can be seen in many cases, while the exact details make it possible to determine the cause of the curvature and make a certain prognosis.

Not only is the shape of the individual vertebræ readily studied, but the internal structure of the vertebræ, the striation of the osseous tissue, the condition of the epiphyseal cartilages, etc., are shown.

Hydatid Cysts of the Kidney.—HOUZEL (*Revue de Chir.*, September 10, 1898) says of the diagnosis of this disease of the kidney that it can be made only by exclusion, and that we must search among the subjective and objective symptoms for those that are convincing.

A tumor that develops gradually, which the patient has perceived only by chance, the evolution of which has been without fever or pain, and has had no general effect upon the system and shows its presence only by symptoms of compression, should always bring to our consideration a hydatid cyst of the kidney. Engagement in occupations such as caring for kennels should strengthen the suspicion, although it is not essential that the patient's occupation should be of this character. The absolute determination is dependent upon the perception of a hydatid vibration, although this has been observed in only two cases out of twenty-eight collected.

The tumor itself is globular, elastic, fluctuating, painless, situated in one of the lumbar regions, forming a certain prominence and having a limited amount of mobility, which may even be entirely wanting. The slowness of the development and its indolence make it possible to exclude cancer and to make the diagnosis of a cyst; but there is no precise clue as to its nature and location. In general the diagnosis is based upon the following points:

The gradual and silent evolution of the tumor, the occupation and habits of the patient, the absence of pain and fever (suppurating cysts of course being excluded), the absence of urinary troubles, the globular form of the cyst, the fluctuation, the hydatid vibration, the immobility in connection with the respiratory movements, the limited general mobility.

The kidney can sometimes be detected beside the cyst, and the position of the tumor at one side of the abdomen, in the lumbar region, extending beneath the ribs and making a prominence in the lumbar region, indicates that the kidney is the organ involved.

The discharge of hydatid vesicles by the mouth or anus, and especially in the urine, this taking place during an attack of nephritic colic and being coincident with a diminution of the renal tumor, is pathognomonic.

Spontaneous recovery from this condition is not to be counted upon. It is so rare and is accompanied by such grave chances that intervention as early in the disease as possible is always indicated. Rupture or suppuration are both dangerous, while the retention of the parasite or the rupture of its sac leads to far more serious complications than those which accompany its course of development. No matter how gradually the cyst develops it always has a fatal termination, either from the excess of its development, from its rupture, from its suppuration, or from its influence in a mechanical way upon the nutrition, the respiration, or the circulation.

There are two methods of curing these cysts—nephrectomy and nephrotomy.

Nephrectomy is an exceptional operation, which should be undertaken only in rare instances and under exceptional circumstances.

Lumbar nephrotomy is the preferable operation and the one which should be employed in the majority of these cases.

Suprapubic Transplantation of the Penis.—WAGNER (*Centralblatt für Chir*., July 30, 1898) reports a case in which, as the result of trauma, so great a defect ensued in the posterior portion of the urethra that it was impossible to close it by the usual methods. There had been great loss of tissue, with a recto-vesical fistula as well as a perineal one, and the rectum had been so injured that it became necessary to do a formal resection of the lower portion for the resulting stricture.

The extensive scar-tissue which resulted from these conditions made it impossible to obtain normal skin for a plastic operation. Mikulicz, who was the operator, therefore determined upon a new and radical measure. An incision was made from above the symphysis pubis down upon the dorsum of the penis, and reached the bone. The ligaments supporting the penis were detached, and with them the entire penis without injury to it. The peritoneum was displaced upward and the bladder-wall exposed. A deep groove was cut in the symphysis pubis, which permitted the penis to lie in it. The urethra was then united to the bladder above the symphysis, and a catheter passed through into the bladder, where is was permitted to remain. The case followed a very satisfactory course. The union of the penis to the bladder was uncomplicated, while the urethra was kept dilated by the judicious employment of gradual dilatation by sounds. The urine was passed by the catheter, and the patient at the time of the report was able to retain the urine for two hours and then pass it in a stream. Sounds, however, had to be used regularly to keep the urethra from contracting. The perineal fistula decreased in size, but urine would dribble through it if it was retained over two hours. The result attained was far preferable to any that could have been secured by other means, and is one that can be employed wherever there has been an extensive destruction of the prostatic and membranous portions of the urethra.

THERAPEUTICS.

UNDER THE CHARGE OF

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Treatment of Insomnia.—Dr. Robert T. Edes believes that a normal and sufficient general nutrition is to be looked for as the basis for normal cerebral nutrition, but this does not necessarily imply the stuffing process. A useful criterion is the body-weight in reference to the height and usual or normal condition of the individual, and diet is to be regulated upon this basis. Secondly, the distribution of the blood is to be equalized, with the balance, however, tending to anæmia of the brain rather than the reverse, though by no means to an extreme. The derivation of blood may be accomplished by hot baths of the feet or of the lower half, or even the whole body, emphasized, if necessary, by a little mustard. The well-known expedient of a small amount of easily digestible food just on going to bed, or on waking up in the course of the night, probably acts, to a considerable extent, at least, in the same way. A hot toddy adds to a slight direct narcotic effect the early vasomotor dilating action of alcohol. Cold feet are often an accompaniment or partial cause of insomnia, and it is well to promote the circulation in them by a hot bath for five minutes, followed by a short, cold douche and friction, rather than simply to attempt to warm them by hot bottles.

Hypnotics may be roughly divided into two classes: (1) Those which diminish nervous irritability; and (2) those which distinctly, though perhaps not profoundly, narcotize the nervous centres. Of the first class the bromides —the potassium salt preferred—given in two or three doses during the latter part of the day, and in many chronic cases through the day, are valuable. If there is much nervous excitability and restlessness during the day, a bromization lasting a few days or a week or two is occasionally admissible. It is not believed that the hypnotic is yet discovered, or ever will be, which is at once trustworthy as producing the desired result and incapable of producing any unpleasant after-effects. Sulphonal comes as near to that standard as any drug, and used with care is little likely to do harm, except that which attaches to any habit of this kind or dependence upon artificial aids to sleep. The tardiness and permanency of its action cannot be looked upon as a disadvantage when properly allowed for. A second good night without renewal of the dose is not unusual. Fifteen grains are sufficient, and its use should not be prolonged beyond an emergency period of four or five days, without an interval of more than two days. Trional seems to enjoy most of the advantages of sulphonal, except that its effect does not last over two nights. Paraldehyde is a rapidly acting and sure narcotic, probably coming much closer to alcohol in its mode of action than the coal-tar preparations, but it may give rise to symptoms resembling mild delirium tremens, and it has a most disagreeable taste and smell, which may or may not be a disadvantage.—*Journal of the American Medical Association*, 1898, vol. xxxi. p. 757.

Septic Endocarditis.—DR. LUDWIG HERZOG, from his observations of nine patients suffering from this disease, presents the following treatment: The important consideration is the strength of the patient, which must be increased by all means possible. Milk, eggs, port wine, brandy, and strong coffee suggest themselves. A water-bed is beneficial. The affected joints should be protected, kept at rest, and an ice-bag placed upon them; internally, sodium salicylate in solution should be administered. An ice-bag should be kept constantly upon the heart; in case of high fever, another upon the head. If a febrifuge is required, seven grains of quinine in powder or wafers are recommended. If severe diarrhœa supervenes, fifteen grains of bismuth subnitrate, or tannic acid, three grains, with one-tenth of a grain of opium, may be given every hour or two.—*Deutsche medicinische Wochenschrift*, 1898, No. 45, S. 716.

Saline Solutions in Medical Diseases.—DR. BOLOGNESI concludes an elaborate paper by stating that the physiological saline solution is a valuable therapeutic agent. Its action upon vascular tension and in producing hæmostasis is well known. Numerous observations and experimental physiology have not yet given an explanation of its mode of action on intoxications and infections. This much we know: the injection, whether intravenous or subcutaneous, raises arterial tension, favors diuresis, diaphoresis, and the secretions in general. It does not produce, as has been claimed, a lavage of the blood, a disintoxication of the organism. Intravenous injections should be made only in case grave surgical or obstetrical hemorrhage has brought about an acute anæmia sufficiently grave to produce speedy death; also in traumatic or operative shock. In the infections normal saline solutions may be employed hypodermatically or by rectal injections as soon as diminished vascular tension appears, the general condition is grave with enfeeblement of the organism, or in default of proper action of the emunctories. The quantity should be regulated carefully, and the action upon the heart and kidneys always kept in mind, lest, these being injured by the infection, the treatment may cause further damage. Those infections and toxæmias for which bleeding is applicable should be bled before resorting to this method. Aside from their stimulant and eliminant action, they nourish the patient and assist him as do no other excitants and stimulants ordinarily employed in the infections; but these solutions are not microbicides nor antitoxics.—*Bulletin Général de Thérapeutique*, 1898, T. cxxxvi. p. 778.

Gelatin Hæmostasis.—DR. PAUL CARNOT reports upon its indications and contraindications. For local use the formula, gelatin, 5; calcium chloride, 1; water, 100, is useful. This may be sterilized by heat, but not at a temperature higher than 239° F., lest its solidification be interfered with. If the wound is septic, this treatment will suffice. The results are generally good. To increase the general coagulability of the blood, subcutaneous injections have been proposed. In practice these have been found to be dangerous. In ingestion of this preparation, or by hypodermatic injection of calcium chloride alone, we have a safe method which is equally useful in the treatment of hemorrhage at a distance or in certain hæmophilias.—*La Presse Médicale*, 1898, No. 94, p. 295.

Urotropin.—DR. T. K. HOLMES reports that a patient suffering from cystitis resulting from prostatic hypertrophy was not relieved by tying the vas deferens nor by washing the bladder with a boric-acid solution. Seven grains of this remedy, twice daily, reduced the urgency of urination, cleared the urine of pus, and enabled him to remain in bed at night, rising only once to micturate.—*Dominion Medical Monthly*, 1898, No. 5, p. 186.

[A more complete report by the editor, covering the use of this substance in cystitis due to prostatic hypertrophy, pyelitis, phosphaturia, and cystitis consecutive to gonorrhœal urethritis, is to be found in the *Medical News*, 1898, vol. lxxiii. p. 609. At present observations are being conducted to determine its value in tuberculous cystitis. Thus far they encourage the hope that a remedy of real worth has been found.—R. W. W.]

The Abuse of Ergot in the Treatment of Hemorrhage.—DR. FREDERICK A. PACKARD presents a timely paper, which points out that in medical hemorrhage our object should be to endeavor to favor the formation of a clot in the ruptured vessel by measures that increase the coagulability of the blood, by calcium chloride, or, where possible, by local applications (such as the topical use of such remedies as hamamelis in epistaxis, the gentle inhalation of turpentine or other hæmostatic vapor in hæmoptysis, the administration of tannic acid in hæmatemesis, of lead acetate in hemorrhage from the bowels), to prevent mechanical disturbance of the clot by producing local rest (opium to check cough and to stop peristalsis), and to lessen blood-pressure (as by restriction of ingestion of liquids, by the use of saline laxatives where permissible, by the hot-foot bath, by ligature of the extremities, by veratrum viride, nitroglycerin, or venesection, according to circumstances); but, above all, to avoid any cause for increase in blood-tension, and especially to abstain from the use of ergot, which is, of all drugs, the most active in lessening the capacity of the arterial tree.—*University Medical Magazine*, 1898, No. 3, p. 134.

[For hæmoptysis, calcium chloride and tincture of aconite, given alternately, are generally efficient. In general, for this purpose aconite should be substituted for veratrum, because it is equally effective, more easily managed, and far less irritating to the stomach.—R. W. W.]

Animal vs. Vegetable Ferments.—Dr. A. E. Austin has conducted laboratory experiments in order to determine the relative converting power of saliva, pancreatin, and taka-diastase upon starch. He finds that the last possesses a greater power in converting starches, in proportion to its weight, than does saliva or pancreatin. All these digestants are practically nullified in an acidity equivalent to that of gastric juice, so that practically no digestion can take place in the stomach from any of these. Further, these digestants are not destroyed by the acidity of the gastric juice, and there is no practical reason why their activity should not go on after they have passed into the intestines and alkalinity is re-established. Taka-diastase apparently carries the process of amylaceous digestion a step further than the other two, forming dextrose instead of maltose. In how far this is of value cannot be determined until more is known about the conditions attending the secretion of the succus entericus which contains the major part of the invertin and it is learned whether this substance is ever absent.—*Boston Medical and Surgical Journal*, 1898, vol. cxxxix. p. 567.

Apocynum Cannabinum ("The Vegetable Trocar").—Dr. T. S. Dabney deplores the inaccuracy or absence of accounts in the various works on materia medica of Canadian hemp. After twenty years' use of the drug he finds that, contrary to the general teaching, it does not cause diaphoresis or expectoration. Emesis and catharsis follow only its improper use. It is its very great diuretic action that makes it invaluable. To apocynum he ascribes great invigorating power through increased keenness of appetite, while causing immediate resorption of albumin into the general system from the dropsical body-cavities. Under the exhibition of this drug one to two gallons of urine may be passed daily. Thus the surplus fluid is excreted by natural channels. The albumin lost is recovered by the blood, and the weakness following the customary paracentesis for ascites is avoided. The withdrawal of apocynum from general use the writer attributes to the close structural relationship between this drug and *apocynum androsemifolium*, which latter is wholly inert. Through conscious or unconscious substitution of this for Canadian hemp proper the great merits of the latter have been lost sight of. Thus the drug on the market is wholly unreliable, and so has fallen into disrepute. The writer, therefore, insists on using a pure preparation of the pure drug—either tincture, fluid extract, or infusion—in order to gain results. He cites a number of instances of various forms of Bright's disease in which anasarca was completely done away with. The urine was regularly increased in amount. The number of casts and the quantity of albumin seemed regularly diminished, and general improvement speedily followed. Dropsy due to cirrhosis of the liver was also benefited. Hydrothorax and œdema of the legs caused by aneurisms of the ascending arch of the aorta entirely disappeared in two weeks. Anasarca complicating the various forms of organic heart-disease also improved greatly. He concludes by stating the physiological action of apocynum to be, clinically: To strengthen and tone up heart-action; to regulate markedly the irregular heart—not slowing the normal heart, nor increasing the blood-pressure, there being no contraction of the arteries. He compares it with strophanthus, but considers apocynum far more active. Its diuretic action is indirect and due to its "cardio-kinetic" effect, and not through stimulation of the renal epithelium. Decoctions of the drug cause mainly catharsis and emesis. Two alkaloids have been isolated—apocynin and apocynim. The advantages in recommending apocynum are: 1. Small amounts requisite for diuresis, emesis, or catharsis. 2. Pleasant taste. 3. Tonic properties, compensating for depression following free catharsis. 4. Harmlessness, an overdose being followed by emesis. Dose of the tincture is twenty drops, increased to thirty drops thrice daily. —*Therapeutic Gazette*, 1898, vol. xxii. p. 730.

Airol in Pellagrous Intestinal Diseases.—DOTT. F. CERATO distinguishes three forms: (1) Chronic catarrhal enteritis; (2) dysenteric catarrh, and (3) serous catarrh. While calomel and opium in small doses may be of use in the second variety, they are useless in the third. Even in the second they present many disadvantages in the treatment of emaciated individuals and in those suffering from stomatitis, which so often is found in patients of this class. After experimenting with injections of tannic acid, rhatany by the mouth, colombo, bismuth, tannigen, and tannalbin, temporary improvement followed, but later the diarrhœa reappeared. In nine instances this remedy in from five- to eight-grain doses, frequently repeated, gave excellent results. In seeking an explanation, not only its astringent properties should be mentioned, but its iodine content appears to be responsible for the greater part of its good effects. Although it has been stated that iodine, even in small quantities continued over long periods of time, may produce a gastro-enteritis, this has not been found to be the case with this remedy.—*Gazetta degli Ospedali e delle Cliniche*, 1898, No. 142, p. 1502.

[Airol is chemically bismuth iodo-gallate.—R. W. W.]

Tannalbin in Infantile Therapeutics.—DOTT. OLIMPIO COZZOLINO administers this remedy internally in doses of from three to seven grains five or six times daily, either alone or combined with a hundredth part of calomel, in order to complete the disinfectant action of the former. Recently excellent results have been obtained by means of rectal injections of seven grains in two ounces of a 10 per cent. decoction of starch. Of forty instances of diarrhœa in children varying in age from two months to fourteen years cure resulted in all save two—one a child of seven years suffering from pulmonary tuberculosis, and a child of ten months with advanced atrophy. The treatment is commenced with castor-oil, and later two injections each day are given, with possibly the addition of three drops of tincture of opium. Later iron and quinine may be useful to combat the anæmia.—*Gazetta degli Ospedali e delle Cliniche*, 1898, No. 136, p. 1447.

Treatment of Malignant Pustule.—DOTT. ALFREDO GUTIERREZ reports upon the use of the serum of sclavo in an instance of this disease. Bacteriological examination showed an abundant development of staphylococcus aureus with a few bacilli of anthrax, and these presented characteristic cultivations, and, injected into a guinea-pig, caused death. The pustule was situated over the right side of the jaw of a fourteen-months-old child. Two and one-half drachms of serum were injected in the left hypochondrium. Two hours later two drachms were injected into the right hypochondrium. Improvement in temperature and general condition, and rest followed. Nine hours later the first injection was repeated at the same place. The following day the child slept well, nursed greedily, and the temperature was still lower. The œdema and glandular swellings rapidly decreased, and three days later convalescence was established. Ten days later but the slightest evidence of the site of the pustule could be found. The severity of the disease in this instance and its tendency to extend in alarming proportions make noteworthy the rapid return to normal condition and the speedy subsidence of the œdema, which was brought about by only three injections. Commenting upon the reported case of Mendez and Lemos, this quotation from their paper is offered in conclusion: "The curative effect of the serum appears within four hours; the œdema begins to diminish and completely disappears in about twenty-four hours."—*Il Policlinico*, 1898, No. 20, p. 488.

Treatment of Chorea.—DR. W. ESSEX WINTER states that the first matter of importance consists in keeping the child in bed. This is necessitated by the tendency to endocarditis, and its value is emphasized by its beneficial effect in shortening the disease and bringing about a speedy cure in long-standing cases. The more useful drugs are antipyrine and arsenic—the first in early stages and in acute disease; the latter in later stages and chronic or recurrent cases. A disadvantage in the use of the first remedy is that when prolonged or administered in large doses it may bring out a pink, erythematous eruption, which may lead to the supposition that the child has measles, and sometimes give rise to interruptions in the treatment. The efficiency of treatment by arsenic is often marred by insufficiency of dose. In the majority of instances the dose of Fowler's solution must be increased to ten or fifteen drops in the course of ten days to a fortnight if the symptoms do not decline. Toleration is readily secured, provided that the drug is not given in too large a dose at first or the dose increased too rapidly, the medicine always being given, with sufficient dilution, immediately after food. In some cases arsenic may be pushed too far and produce a serious neuritis, but this is not likely to occur if the patient be kept in bed. In all cases a liberal diet is required, but stimulants are unnecessary. The principal complications are endocarditis and pericarditis, which in the acute stage are best treated by the salicylates. Rarely the movements are so violent and continuous as to bring about contusions and abrasions of the skin, with exhaustion, and chloral and the bromides become necessary. The dose should be gradually increased until either the symptoms are subdued or physiological effects are produced.—*Treatment*, 1898, No. 17, p. 525.

DERMATOLOGY.

UNDER THE CHARGE OF
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The Histopathology of Psoriasis.—MUNRO (*Annales de Dermatologie et de Syphiligraphie*, 1898, No. 11), in order to eliminate all secondary changes, has studied the lesions of psoriasis in the earliest stages, and, as the result of the examination of 1500 sections taken from six untreated cases, he concludes that the disease is not due, as hitherto supposed, to some vice of formation of the corneous epidermis, the abnormal keratinization being an essentially secondary lesion. The primitive lesions of psoriasis are miliary abscesses of the epidermis, situated almost upon the surface of the corneous layer, and around these preformed abscesses the epidermic reaction produces a hyperkeratosis. Although long and carefully searched for no specific micro-organisms were found.

General Exfoliative Dermatitis (Pityriasis Rubra).—WALTER G. SMITH (*British Journal of Dermatology*, December, 1898), in a paper read at a meeting of the Dermatological Society of London, expresses himself as unable, from a general survey of the recorded cases of exfoliative dermatitis, to perceive any clearly defined species, but rather a continuous procession advancing from local forms to the most extensive, and from the less defined to the most characteristic manifestations of diffuse dermatitis. Exfoliative dermatitis may either arise primarily or be engrafted upon a polymorphous basis. No certain boundary line can be drawn between acute general eczema—possibly also psoriasis—and exfoliative dermatitis. It is a question of special vulnerability of the skin in certain individuals to acute, spreading "catarrhal" inflammation.

Leukoplakia Oris in Psoriasis and Other Dermatoses.—SCHÜTZ (*Archiv f. Dermatologie und Syphilis*, Band xlvi., Heft 3) has observed three cases of psoriasis in which there existed at the same time a marked leukoplakia oris. As he has seen a similar affection of the mucous membranes in other diseases of the skin, accompanied by an increase in cornification, such as tyloma palmarum and chronic scaly eczema of the elbows, he does not regard it as a real psoriasis of the mucous membrane. He concludes, however, that the coexistence of leukoplakia and such affections of the skin as are associated with increased cornification is not purely accidental, but dependent upon a condition of the body common to both affections.

The Relationship of Darier's Disease to Ichthyosis.—E. Doctor (*Archiv f. Dermatologie und Syphilis*, Band xlvi., Heft 3) reports a clinical and microscopical study of two new cases of Darier's disease. He concludes that the differences between this affection and ichthyosis, while tolerably well marked, are not sufficient to justify the setting up of a new type of disease. Darier's disease is a hyperkeratosis connected with the hair follicles or the excretory ducts of the sweat glands, but occurring also independently of these. It is usually, but not always, associated with parakeratosis. The so-called Darier corpuscles are a part of the phenomena of parakeratosis, but do not necessarily belong to the disease picture, other forms of cell-degeneration being much more apt to occur. Darier's disease is a variety of ichthyosis, differing from this latter clinically chiefly through its localization and the presence of the Darier nodules, microscopically, by the proliferation of the papillæ and the rete mucosum.

A Case of Pemphigus Foliaceus with Osteomalacia.—Hallopeau and Costenseau (*Annales de Dermatologie et de Syphiligraphie*, 1898, No. 11), at a séance of the Société Française de Dermatologie et de Syphiligraphie, presented a woman, forty-six years old, in whom osteomalacia appeared eight years after the beginning of a typical pemphigus foliaceus. The exhibitors were of the opinion that the coexistence of these two affections was not simply a coincidence, but was probably due to the resorption of the collagenous substance of the bones under the influence of the profound disturbance which the constant loss of organic materials by the surface of the skin brings about in the blood, setting free the phosphates which are normally combined with them.

Acne Varioliformis Capillitii.—Popper (*Archiv f. Dermatologie und Syphilis*, Band xlvi., Heft 2), at a session of the Hungarian Dermatological Society, reported the following case: A man, thirty years old, had suffered for two years from a painful affection of the scalp. Upon inspection, flat, lentil-sized, bluish-red, painful nodules were to be seen scattered over the whole scalp, and between these were small pustules and flat, umbilicated crusts. Very large comedones were also present. After healing of the affected places, deeply situated, unsightly scars remained. The contents of the pustules were frequently examined for micro-organisms, but always with negative results. Treatment consisted in washings with spiritus saponis kalinus and applications of a white precipitate ointment. Improvement appeared after ten to fifteen days.

The Transmissibility of Alopecia Areata.—Plonski (*Dermatologische Zeitschrift*, Band v., Heft 3) reports two observations in support of the theory of the contagiousness of alopecia areata. A nine-year-old boy had had a continually increasing fall of hair for six months. Over the vertex were numerous round, coin-sized, hairless areas. On the occiput was a large, irregularly shaped, bald area, which had evidently been formed by the coalescence of several smaller round ones. The skin was of normal color, free from swelling, smooth, and without scales. Three weeks later a six-year-old sister presented a round, coin-sized, smooth, bald area upon the vertex. The second observation concerned two sisters, the one ten, the other six years old, both of whom presented patches of alopecia areata, in the first instance having lasted one year, in the second, six months.

Atrophying Hyperkeratosis.—DUCREY and RESPIGHI (*Annales de Dermatologie et de Syphiligraphie*, 1898, Nos. 7, 8, 9) have made a new and extensive clinical and histological study of the affection described by Mibelli under the name porokeratosis, and their conclusions concerning this singular disease are as follows: Beside its cutaneous manifestations it may present manifestations upon the buccal mucous membranes, reproducing exactly the types of those upon the skin. By reason of its special and constant characters, clinical as well as anatomical, it should be considered as a particular morbid entity. One cannot confound it with the lichen of Wilson, which seems to be the dermatosis to which it is most nearly related, and it cannot in any manner be ranged in the group of ichthyoses The designation which best sums up the principal characteristics of the dermatosis, at least from the clinical point of view, is figurate centrifugal atrophying hyperkeratosis.

Polymorphous Tuberculosis of the Skin.—BROUSSE and ARDIN-DELTEIL (*La Presse Méd*, 1898, No. 32) report the case of a girl, sixteen years of age, chloroanæmic and scrofulous from infancy, who developed various cutaneous lesions after a disease of the bone occurring upon the right big toe at the age of four years. These lesions were a *tuberculosis verrucosa* of the right foot and leg with elephantiasis, a *scrofulo-tuberculous gumma* of the left side of the face, and a patch of true *tuberculous lupus* on the left cheek. Great improvement resulted from curetting and ignipuncture of the leg, followed by moist antiseptic dressings and the application of chlorophenol to the patch of lupus and the gumma.

Maragliano's Serum in the Treatment of Cutaneous Tuberculosis.—FILETI and LA MENSA (*Giornale Ital. delle Mal. ven. e della Pelle Fasc.*, 1897, i.) treated ten cases of lupus and scrofuloderma with Maragliano's antitubercular serum, using it both subcutaneously and locally. In a case of lupus of the hand occurring in a child, aged nine years, a cure resulted in forty-six days, six injections of the serum having been made in that period, besides using it locally. As no good result appeared, however, in any of the other cases treated by this method, the apparent benefit in this one case was probably only a coincidence.

The Frequency of Verrucose Tuberculosis of the Back of the Hand in the Course of Pulmonary Tuberculosis.—BÉCLÈRE (*Annales de Derm. et de Syph.*, 1898, Nos. 8, 9), at a séance of the Société Médicale des Hôpitaux de Paris, reported four observations showing that verrucose tuberculosis is, of all the forms of cutaneous tuberculosis, the one most frequently seen in pulmonary phthisis. It is seen almost always upon the backs of the hands and fingers, by preference upon the thumb and index-finger. This is due, as Vidal has already pointed out, to the fact that the patient, after having coughed, wipes off the lips and moustache with the back of the hands. Proof of the correctness of this assumption is furnished by the fact that this form of cutaneous tuberculosis is exceptional in women. It results from a direct auto-inoculation, favored by abrasions of the skin in this region.

Cicatrization of an Ulcerating Epithelioma of the Face by a New Method of Applying Arsenious Acid (Czerny's Method).—HERMET (*Jour. Cut. and Gen.-urin. Dis*, November, 1898, from *Annales de Derm. et de Syph.*, 1898, p. 226) cites the case of a physician, aged seventy years, upon whom this treatment was successfully used. The ulcer was cleaned and moistened with the following solution: Arsenious acid, 1; ethyl-alcohol and distilled water, āā 75. The water and alcohol must be evaporated in order that the arsenious acid alone remains in contact with the ulcerated surface. This is the secret of success. The first application is painful, but the pain usually passes away during the process of evaporation. Sometimes severe pain is felt for six or seven hours afterwards.

The best means of allaying the pain is to send the subject into the open air. Morphine is seldom needed. No dressing is required. Immediately after the fixation of the arsenious acid, a profuse serous-bloody liquid begins to ooze. During the night a reddish-brown crust is formed, which is to be removed on the following day. The open surface is then moistened with the same solution, while the crusted area is soaked with a solution of 1 : 100 to 1 : 50. The arsenious acid, penetrating the crusts, destroys the neoplastic tissue beneath. The application must be continued until enucleation on the borders begins. When the crust disappears and the ulcer looks healthy, the wound is treated as a simple sore. Three months' treatment was required to effect a cure in the case reported. [The treatment would seem to be adapted especially to the mild forms of the disease.]

A case in which the lower lip was successfully treated is reported by E. JEANDRAU (*La Presse Méd.*, 1898, No. 73). Here the application according to Czerny's method for two months resulted in complete disappearance of the tumor, there being no recurrence a year later.

A Liquid Soap; a New Base for Remedies; New Wool-fat Preparations.—HERBERT SKINNER (*British Journal of Dermatology*, October, 1898), under the caption of "Pharmaceutical Notes," gives some new formulæ which have been found useful in cutaneous diseases. A liquid soap, highly esteemed, is made of oleic acid, 2 ounces; alcohol (90 per cent.), 3 ounces; solution of ammonia, a sufficiency; water to 6 ounces. This may be perfumed with vanilla to disguise the odor of the oleate. The ammonia is added drop by drop until, after vigorous shaking, the odor can be barely detected. It is then allowed to stand for seven days and filtered through kaolin. Its cleansing properties are far above those of ordinary soap, and the alkalinity is scarcely noticeable.

A base containing wool-fat and lanolin soap, which can be used as an ointment or as a vehicle for the application of certain drugs, is made of lanolin soap, ½ ounce; distilled water, 2 ounces; anhydrous wool-fat, ½ ounce.

The soap is liquefied in the water, and the melted wool-fat added, the whole being transferred to a mortar and vigorously triturated in order to produce a homogeneous paste. The consistency is that of resin ointment; it should be preserved in air-tight jars or made fresh. Any medicaments save acids may be added.

An excellent base for cutaneous remedies consists of the yolk of one egg; lanolin, ½ ounce; rose-water, ½ ounce. Triturate together the lanolin and yolk of egg, then gradually add the rose-water. Used alone, it has a very penetrating and softening effect, far more so than wool-fat alone possesses. In order to form a cream, milk may replace the rose-water, and an antiseptic may be added to preserve the preparation.

Another wool-fat preparation may be made of wool-fat, ½ ounce; glycerin of starch, ½ ounce; white vaseline, 1 drachm. This is readily absorbed by the skin and forms a suitable base for formaldehyde even up to 10 per cent., and no changes occur even after keeping it six months.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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Protargol for Conjunctivitis.—PROF. PFLÜGER (Berne) tried protargol on one eye of an infant suffering from purulent conjunctivitis of the new-born, and on the other eye a warm solution of potassium permanganate. The first eye did not improve, the second did improve. He, therefore, discarded protargol except in connection with cauterizations by nitrate of silver. It caused no pain or irritation.

A. DARIER (Paris) points out that Pflüger used the drug in an utterly ineffective manner (some drops of a one-quarter of 1 per cent. solution morning and evening). He himself has employed a 10 per cent. solution four times a day, or cauterization with a stronger solution twice a day, and the instillation of a 5 per cent. solution between. He uses a 25 per cent. solution without untoward effects. He prefers it to silver nitrate in the treatment of purulent conjunctivitis, being safer and more effective, and much less irritant.

E. VALUDE (Paris) found protargol might advantageously replace silver nitrate in catarrhal conjunctivitis; but it seemed less reliable in purulent conjunctivitis.

M. DESPAGNET (Paris) agrees with Valude. He found the applications not painful, except in one case of trachoma in which it caused very great pain.

In four cases of vernal conjunctivitis protargol had effected a rapid cure.—*La Clinique Ophthalmologique*, July 10, 1898.

B. E. FRYER (Kansas City) finds a 2 per cent. solution of protargol preferable to the mercuric salts in the antiseptic preparation of the conjunctiva prior to cutting operations on the eyeball. It destroys the organisms and is not irritating.—*Transactions of the American Ophthalmological Society*, 1898.

[Silver nitrate is regarded as the specific remedy for purulent conjunctivitis, and other proposed remedies should be compared with it. But thorough cleansing of the conjunctiva is even more important, and if this be carefully attended to the substitution of even some inert substance for the silver nitrate might not be attended with any evil result.]

Sarcoma of the Orbit.—A. W. STIRLING (Atlanta) reports a case of primary sarcoma of the orbit in a girl aged thirteen years. The protrusion of the eye had commenced three years previously, and recently she had suffered pains in and back of the eye. The eye still retained light perception; but it was removed with the whole contents of the orbit. Four days afterward the orbital walls were cauterized with chloride of zinc paste. No recurrence of the growth had shown itself after a year. A study of cases operated on at the Royal London Ophthalmic Hospital shows that the prognosis as to recurrence is not so good for primary sarcoma of the orbit as for primary sarcoma of the uveal tract. The growth recurred in nine out of sixteen cases after removal of the contents of the orbit. In ten cases of removal of the growth alone, without emptying the orbit, nine suffered a recurrence, and the tenth remained under observation for only eighteen months.—*Ophthalmic Record*, July, 1898.

Parinaud's Conjunctivitis.—H. GIFFORD (Omaha) reports five cases of this disease, which he prefers to call by the name of Parinaud, who first described it, in 1889, as an infectious conjunctivitis of animal origin. Gifford believes the grounds for thinking it of such origin are entirely insufficient. But it is evidently infectious, although apparently non-contagious. Bacteriological investigations have given no clue to the nature of the germ causing it.

The disease is characterized by sudden onset, great thickening of the lids, muco-purulent discharge rapidly becoming scanty, the formation of large and frequently polypoid granulations, with smaller granulations between them, and between or on the granulations occur erosions or small ulcerations. With the conjunctivitis, sometimes before it, there occurs sudden inflammation of lymph-glands on the affected side. Most frequently the pre-auricular or retro-maxillary glands are affected; but sometimes the cervical and submaxillary. This affection of the lymphatics is generally very marked, the swelling may be enormous, and suppuration may occur. Rigors and fever may mark the onset of the disease. But one eye is affected.

Left to itself the disease undergoes spontaneous cure in from two to six months. If the granulations are few and large the best plan is to clip them off and cauterize any ulcerations that may exist. The galvano-cautery, iodoform ointment, and astringent applications, as silver nitrate and copper sulphate, have been recommended. But if the granulations are numerous, the recovery will be slow under any treatment.

Retinitis Circinata.—E. AMMANN (Zürich) reports the first case of this disease in which the opportunity was presented for anatomical examination of the affected retina. The condition, first described by Fuchs in 1893, is characterized by a collection of white spots in the retina arranged in the form of a wreath. This wreath may extend around the macula, or encircle the disk, or be located elsewhere. The spots composing it may run together, forming a white plaque. Retinal hemorrhages occur, and the smaller retinal vessels may be markedly abnormal. The appearances suggest albuminuric retinitis; but the arrangement of the spots differs notably from the arrangement typical of that affection. The condition does not especially depend on syphilis, gout, albuminuria, or other recognized general disease; but albumin may be found in the urine.

Amman found that the retina presented great numbers of small hemorrhages that were not observed during life or macroscopically. The white spots clearly had their origin in hemorrhages, although they could not be seen to follow the hemorrhages directly, because in an intermediate hyaline stage they became invisible. The white spots were areas of fatty degeneration.—*Archives of Ophthalmology*, vol. xxvii., No. 2.

Glioma of the Retina.—C. D. MARSHALL (London) reports thirty-two cases which have been treated in the Royal London Ophthalmic Hospital since 1890. In five of these both eyes were removed for the growth. In 35 per cent. of the cases the tumor was detected during the first year of life; in over 80 per cent. it occurred before the child was three years old; in fifteen cases there was no recurrence, twelve of these having been seen after three years. He, however, reports one case in which, after removal of the eye, the child remained in good health for five years, and then suffered with what the surgeon in charge said was a recurrence of the growth in the brain.

In one case of undoubted glioma the tumor had undergone atrophy, with shrinking of the whole globe. He includes one instance in which three children of one family suffered from glioma, two of them dying of it. Such an occurrence is probably very rare, but should be borne in mind when the surgeon is asked about the possibility of the same disease affecting other children of the same parents.

In any case the prognosis after removal must be guarded, even though the growth be comparatively small, and it is exceedingly important to remove such a growth as soon as possible after its appearance.—*Roy. Lond. Ophthal. Hosp. Rep*, vol. xiv. p. 456.

Mechanism of Strabismus.—J. H. FISCHER (London) calls attention to the very important influence of the accessory adductors and abductors of the eyeball in causing and perpetuating concomitant strabismus. He suggests that the combined actions of the extra-ocular muscles in effecting even the most simple movements should be more fully recognized. As the eye is turned out the oblique muscles become abductors, with more and more power of abduction the further the eye is turned in that direction.

On the other hand, the superior and inferior recti muscles are accessory adductors, with no power of adduction if the eye is turned outward; but with increasing adductive power as it is turned toward the nose.—*Royal Lon. Ophthal. Hosp. Rep.*, vol. xiv. p. 448.

[It is gratifying to note the more general recognition of the folly of regarding convergence as merely a function of the internal rectus and divergence a function of the external; and the equal folly of attempting to overcome all sorts of convergent and divergent squints by operations upon one or the other or both of these muscles. The surgical work of the last few years upon the extra-ocular muscles has brought this positive advance. It has to some extent revealed the incorrectness of most of the theories upon which that work was based.]

Hemianopsia and Blindness Following Uterine Hemorrhage.—A. R. Amos (Des Moines) reports the case of a woman, aged fifty years, extremely anæmic after repeated uterine hemorrhages, who suffered from right hemianopsia, coming on suddenly with dizziness and headache. Subsequently she underwent an operation for removal of a uterine fibroid, and three days later became entirely blind. Subsequently central vision returned so that she could read Jaeger test-type at fourteen inches, but only one letter at a time, the rest of the field of vision remaining entirely blind. The restored field was not over five degrees in diameter. The ophthalmoscopic appearances remained normal throughout. The case is probably one of double homonymous hemianopsia from two lesions symmetrically placed, occurring at different times.—*American Journal of Ophthalmology*, June, 1898.

Extract of Suprarenal Capsule in Ophthalmic Practice.—J. J. Kyle (Marion, Ind.) confirms the observations of Dr. Bates regarding the astringent effect of the powdered extract of the suprarenal gland. When used in the eye, nose, or throat, no smarting or irritation is produced. In the eye there is a sense of coolness, with no mydriatic or myotic effect. The conjunctiva, regardless of congestion, turns suddenly pale, due to contraction of the coats of the vessels, and remains so from one to two hours. Nor do we notice any congestion after this astringent effect has subsided. The conjunctiva, furthermore, manifests no intolerance from long use of the drug.

In operations upon meibomian cysts, in which complete anæsthesia under cocaine is difficult to secure, on account of the great vascularity of the parts, by using the extract as indicated the operation can be done with distinctly less pain than when cocaine is used alone. The extract is especially indicated in cases of chronic trachoma characterized by marked vascularity and lachrymation, in pannus, lachrymal inflammation, acute conjunctivitis, panophthalmitis, and iritis. Again, in operating upon the lachrymal duct, complete anæsthesia is procured by injecting a few drops of the extract preliminary to the cocaine.

Care must necessarily be taken in preparing the solution and in keeping it thoroughly sterilized. It is wise, as far as possible, to prepare fresh solutions. To do this take twenty grains of the saccharated gland and a 2 per cent. solution of phenic acid; mix, and filter through filter-paper. This gives a clear solution of a brownish-red color, which must be kept corked and free from light. Two or three drops in the conjunctiva produce the complete astringent effect.—*Ophthalmic Record*, April, 1898.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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On the Hæmatozoan Infection of Birds.—W. G. McCullom (*Journal of Experimental Medicine,* January, 1898) has continued in Canada the observations which he began at the Johns Hopkins Hospital. He gives observations on the temperature of an infected crow, but the difference between the temperature of that and a normal bird does not seem sufficient to establish the idea of fever. The main work of McCullom's is on the flagellate forms of the organism. The granular forms of the halteridium never become flagellated, the clear forms alone becoming so. Flagellæ never develop while the organism is enclosed. He found an elongated organism in one case to move slowly across the field, followed by others. He found that these arose from the corpuscle without flagellation. Watching this from fifteen to twenty minutes, it was easy to see the change from the non-motile into the motile elongated organism. He observed in the same field a granular form and a hyaline form. The hyaline body burst from the corpuscles, threw out active flagellæ, which beat about for a few moments and finally tore away. One of the four flagellæ passed out of the field, but the remaining three proceeded toward the granular form, surrounded it, and one of them dashed into it, finally wiggling its whole body into the organism, which again became perfectly round. The remaining flagellæ, seeking to repeat this process, were evidently repulsed, and soon became inactive and degenerated. Immediately upon the entry of the flagellum the pigment of the granular body was violently agitated without any disturbance of the outline. Then a conical process appeared at one margin of the organism which developed into an elongated fusiform body which swam away with a gliding motion. He thinks that this is a sexual process; the granular is the female form, and the hyaline the male form, the flagellæ being analogous to spermatozoa.

Since writing this article he has seen the same process of apparent impregnation in case of malaria of the æstivo-autumnal type.

Studies on Trichinosis with Especial Reference to the Increase of the Eosinophilic Cells in the Blood and Muscle; the Origin of these Cells and their Diagnostic Importance.—T. R. Brown (*Journal of Experimental Medicine,* May, 1898) gives the clinical history with the results of the examination of the blood and muscles in two cases. The most common lesion in the blood consisted in the increase of the eosinophiles. In the first case on the first examination the blood contained 37 per cent. of eosinophiles. The eosinophiles were perfectly normal, their nuclei were polymorphous, and they were slightly larger than the polymorphonuclear neutrophiles. In the course of two months the eosinophiles fell to between 12 and 15 per cent., at which point they remained for two weeks. They then began to increase in number, and reached 68 per cent., forming more than two-thirds of all of the white corpuscles.

In the second case the number of eosinophiles was marked, making 42 per cent. of the total leucocytes. In a portion of a muscle there were numerous cells whose protoplasm showed a marked affinity for the eosin stain. The fact that some of these elements were still connected with the muscle and often showed a slight striation would seem to indicate that they were derived from the muscle substance. Throughout the muscle, between and within the fibres, there were many eosinophilic cells and ordinary polymorphonuclear leucocytes. In a specimen taken two weeks later more advanced stages of the same process were found.

He summarizes his work as follows:

In a case of acute trichinosis there was extensive leucocytosis with an absolute and relative increase in the number of eosinophilic cells associated with a decrease in the number of neutrophiles. From the examination of a specimen of muscle removed during life, beside the peculiar degeneration of the muscle, there was a longitudinal split of some of the fibres; in others, transverse splitting. There was great proliferation of nuclei and large numbers of polymorphonuclear eosinophilic cells, which were especially prevalent in some of the degenerated areas.

In a second case, beside similar changes in the muscle, there were large numbers of eosinophiles in the infected area. In two other cases there was great increase in the eosinophiles, with a coincident decrease in the polymorphonuclear neutrophiles associated with leucocytosis. The similar character of the nuclei of eosinophiles and of neutrophiles, both in the blood and in the muscles, and the presence of certain cells which might be regarded as transitional forms, suggest that the increase may take place in the muscle by direct transformation of the neutrophiles.

The article is accompanied by two plates showing the condition of the blood and the muscle.

An Experimental Study of Fat Starvation, with Especial Reference to the Production of Serous Atrophy of Fat.—C. A. HERTER (*Journal of Experimental Medicine*, May, 1898). The basis of the paper was to determine whether the lesions of rickets or similar lesions can be produced by withholding fat from the food of growing animals. The author chose pigs for his experiments. In the first experiment a pig two months old was fed with milk from which the fat had been removed, and contained less than one-two-hundredth part of the fat of sow's milk. The duration of the experiment was fifty-one weeks. During the first eight or ten weeks the animal seemed to be in every way normal except that he did not gain in weight. Constipation was marked during the experiment. After thirty weeks weakness in the hind legs was noted. After fifty weeks he was unable to stand. The muscles were flabby, but showed no indication of wasting. Examination of the blood just before death showed the hæmoglobin reduced to 65 per cent. As a result of a number of experiments it was found that a growing pig, which was fed exclusively on this milk for but one year was retarded in growth, suffered markedly in nutrition, developed a hemorrhagic eruption, and showed marked weakness of the extremities. At the autopsy of pig No. 1, in the place of the fat there was a homogeneous translucent layer of gelatinous-looking material. This gelatinous layer consisted chiefly of spherical and oval cells, the average diameter of which was from one-half to one-sixth that of normal fat cells. Between these cells were bundles of connective-tissue fibres and elastic fibres. In another pig the skin from the back of the neck was removed from time to time; after nine weeks some shrinkage in size and some irregularity in the form of the fat cells was noted. After fourteen weeks they were shrunken from two-thirds to one-half of the normal size. Twenty weeks from the beginning of the diet the fat appeared pale, but not quite gelatinous, and the cells showed still further reduction in size. The serous surfaces of one pig showed a number of small superficial hemorrhages. The lower lobe of the right lung showed numerous infarctions. The kidneys appeared large in comparison with the body weight. There was considerable granular degeneration in the tubules, and desquamation. He considers the condition one of chronic parenchymatous degeneration. In pig No. 1 an endeavor was made to determine the nature of the subcutaneous gelatinous material. From this a proteid, probably nucleo-albumin, was derived. The lesions resulting from fat starvation, at least in the pig, did not resemble or even suggest those of rickets. Second, prolonged fat starvation leads to the entire disappearance of fat from the adipose tissues. The form of fat atrophy observed as the result of experimental fat starvation corresponds to serous atrophy described by Fleming, and is essentially the same type of fat atrophy as that found in the epicardial and perineal fat in the human subject as the result of wasting disease.

Ueber Spontane Gangrän.—HAGA (*Virch. Archiv*, clii.) describes a form of gangrene which is comparatively common in Japan. The gangrene begins spontaneously in the form of fissures or ulcers of the toes, then advances slowly until a line of demarcation is formed between the sound and diseased tissue. In some cases the gangrene heals under suitable treatment; in others it advances continuously and extends to the thigh. He gives thirty-four cases, of which only one was in a woman. The disease was most frequent between thirty-eight and forty-seven years, showing a marked difference from senile gangrene. He gives the clinical history of a number of cases. In all of the cases the radial pulse was hard and difficult to feel. The most important lesions in the examination of the tissues were found in the arteries of the part.

The illustrations which accompany the article show in some cases the typical picture of obliterating endarteritis; in others the arteries seem to become closed by an organized thrombus. In nine of the cases, along with the obliterating endarteritis, there was a cellular infiltration in the tissues, which he regarded as showing the syphilitic character of the process.

Notes on the Pathological Changes in the Organs of Birds Infected with Hæmocytoza.—W. G. MCCULLOM (*Journal of Experimental Medicine*, January, 1898) gives the results of autopsies performed on the infected birds, the blood of which was studied by Opie. The conditions found in infection with the two sorts of organisms were practically identical. The capillaries of the liver were, as a rule, dilated, but in a few instances they were in places so crowded with infected corpuscles that the lumen was occluded. Isolated infected corpuscles were seen scattered in the capillaries of the liver, but were more numerous in the larger vessels. The organisms, in greater or less proportion, were extruded from the corpuscles and lay in the capillaries as pigmented spheres. The larger masses of pigment in the liver were contained in large cells similar to those found in malaria. The pigment was both black and straw-colored; did not give the iron reaction. The pigment was not only contained in the large macrophages, but was also found in the endothelial cells of the capillaries. Little could be said of the effect of the organisms or their products on the tissues. Necroses were observed in the organs of several specimens, but their dependence on the parasites could not be proved. The spleen is deeply pigmented, the pigment being contained in the large cells in the pulp. Degenerative changes similar to those found in the liver were found in the spleen. The visceral changes were not marked. The brain was normal. Organisms were occasionally seen in the capillaries, but they were never collected in masses sufficient to occlude the lumen. In general the changes found in the organs were very similar to those found in malaria.

HYGIENE AND PUBLIC HEALTH.

UNDER THE CHARGE OF

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Relation of River and Ground Water.—In providing for public water supplies wells are frequently sunk alongside of rivers for the purpose of intercepting the ground water on its way to the stream. It is perhaps most often done when the supply has hitherto been pumped from the river itself and it is desired to supplement it by a purer water for which little if any filtration is required. That such is the natural and most usual course for the ground-water to take is well known; but, being dependent on gravitation and the relative degrees of pressure exerted by the water in the river bed and in the porous soil around, it is liable to variation or disturbance.

Thus when the river flows through a highly permeable sandy soil the levels of its stream and of the ground water rise and fall together as parts of the same stream and moving in the same direction (*e. g.*, Bath, N. Y.), and when, in consequence of prolonged drought or excessive pumping, the level of the ground water has sunk below that of the river or of its bottom the movements of the waters are reversed, that in the stream percolating outward to maintain the level of the former; but, owing to the short distance it has to travel and the depth beneath the zone of nitrifying bacteria at which it enters the soil, its filtration or purification may be very imperfect, involving the casual unforeseen pollution of a normally pure supply. In a valuable contribution to the proceedings of the German Society of Physics and Economics, Dr. H. JÄGER describes his method of determining the occurrence and the extent of intermixture by thermometric observation, followed and confirmed by chemical and bacteriological examination, the last means being under these circumstances of limited application. The municipal authorities of Stuttgart, proposing to substitute wells near the banks of the Neckar for the existing supply obtained from the river itself, sank an experimental boring about sixty yards from the river side. Dr. Jäger having noted the constant low temperature of the ground water as observed in the well, and that of the warmer river, as well as their chemical constitution and the number of bacteria in each, caused the well to be pumped until the water had sunk several feet. When it was about regaining its ordinary level the observations and examinations were repeated, and the temperature of the ground water was found to have risen considerably. Dr. Jäger, assuming this to be due to an admixture of the warmer water from the river bed, and employing a formula familiar to mathematicians, estimated the proportion of admixture at over 40 per cent., a conjecture closely confirmed by the simultaneous change in the percentage of chlorine and organic matter. The number of bacteria, however, though 28,000 to the c.c. in the river, had not risen above their normal, 10 to 12, the natural earth filtration having sufficed to arrest them.

Similar observations were made and led to like conclusions in the case of a large reservoir at Breslau, constructed in the low land adjoining the river, but receiving its supply from springs and unpolluted streams of unimpeachable purity among distant forest-covered hills.

Dr. Jäger is convinced that, while gravelly and many rocky river beds are obviously permeable, mud bottoms are not so wholly impervious as is commonly supposed: and that, even if they be so under ordinary conditions, the scour consequent on a heavy fall of rain or the strong current produced in a channel narrowed by masonry may lay bare the underlying rock or gravel, rendering percolation outward certain to follow a considerable lowering of the ground water.

Oysters and Typhoid Fever.—It is now several years since the possible connection between infected shell-fish and typhoid fever was established beyond peradventure, and nowhere has the matter been studied more carefully than in this country and in England. DR. ARTHUR NEWSHOLME (*Public Health*, September, 1898) has been much interested in the subject with special reference to Brighton, where the sanitary authorities find that, notwithstanding great care taken to prevent typhoid fever arising from infected water and milk and contaminated subsoil, they have more typhoid than might reasonably be expected. Investigation has shown that a large proportion of the cases may fairly be attributed to the ingestion of oysters and mussels infected by sewage. It appears that most of the shell-fish consumed in Brighton are derived from beds near which sewage is discharged from a population in which typhoid fever is endemic, and that sewage-derived organisms have been found both in the mud and in the oysters themselves by Dr. Klein and Professor Boyce. Of the total number of cases of the disease occurring in Brighton during 1897, 30.7 per cent. were definitely traced to sewage-contaminated oysters and mussels; during 1896, 31.8 per cent.; during 1895, 33.9 per cent.; and during 1894, 38.2 per cent. The sanitary authorities, in consequence of the evidence of the connection, attempted, in 1896, to secure legislation to prohibit the sale, in the borough, of shell-fish known or suspected to be the cause of infectious disease, but without success, and the Local Government Board are now memorialized to confer this power on local authorities generally.

Water-borne Typhoid.—The report of the Local Government Board on the epidemic of typhoid fever at Maidstone places the blame for the outbreak where it usually belongs in such cases—that is, on the water-supply—and exonerates the defective system of sewerage, which the water company tried in vain to convict. During the ten years 1887–1896, the death-rate of Maidstone averaged well under that of England and Wales as a whole, and the typhoid death-rate was considerably less than half of that of the whole country. The town sewage is treated with lime and discharged into tide-water. Part of the town has defective, leaky old sewers, and half of the houses have water-closets with no mechanical means of flushing. The water is from three sources, but most of it is supplied by a water company which derives it from three systems of springs. Nearly four thousand of the six thousand houses supplied by this company receive water from the Farleigh Ragstone springs, examination of which showed that they are in no way protected, that the gathering-grounds of some are covered with heavily manured gardens, and that the storage reservoirs are liable to pollution by surface water and are occasionally flooded.

On September 12, 1897, there were six notifications of typhoid fever, and on the following day there were seven. Six days later the number of notifications had reached 206, and it was then noticed that the disease was almost entirely confined to the area of the Farleigh supply. Examination of the springs showed two rabbits in the catchpit of one, human feces near the cover of two others, a large deposit of decomposing feces, from a privy in a disgraceful condition, flooding the ground about fifty yards from another, many deposits of human feces in a field close by another, and fecal deposits in the immediate vicinity of several of the rest. The Sanitary Committee asked that this entire supply be cut off, and this was shortly brought about. By October 10th the notifications had reached a total of 1551, and then the weekly number began to decline sharply, so that during November there were but eighty, and during December but fifteen cases reported. During the three weeks and a half ending October 4th, the average daily number of cases was 50.8. It was during this interval that the water from the Farleigh springs was entirely shut off. During the next week the daily average number of new cases fell to 14, in the next two weeks to 5.7, and during November and December as above stated.

Repeated chemical and bacteriological examination of the water by a number of experts showed excessive organic pollution. The specific organism of typhoid was not detected, but there was nevertheless abundant proof of fecal contamination. As the report truly says, "The specific pollution of typhoid fever, which is certainly beyond the reach of chemistry and also of bacteriology to detect, may escape detection in a water in which it is nevertheless present. Further, it is to be borne in mind that detection of a specific pollution of a supply may come too late to prevent the consumption of the contaminated water."

There were many cases of the disease that could not be attributed directly to the Farleigh water, especially those which appeared a long time after the shutting off of the supply, and these cases must be put down as of various unknown origin—direct contact, soil pollution and defective sewerage, for instance. That the committee was justified in having "no hesitation in coming to the conclusion that the epidemic was caused by pollution of the water supplied by the Maidstone Company from their Farleigh sources" is sufficiently shown by the fact that 27.5 per cent. of the houses supplied by Farleigh water were invaded by the disease, and 8.08 per cent. of the persons living in them were attacked, while the corresponding figures for the two other water sources (Crossington Springs and Boarley Springs) were 2.80 and 0.86, and 4.46 and 0.97, respectively.

Harben Lectures.—The Harben Lectures for the year 1898 were delivered by Sir R. Thorne-Thorne, K.C.B., F.R.S., F.R.C.P., Medical Officer to the Local Government Board and a member of the Late Royal Commission on Tuberculosis, who took for his subject the "Administrative Control of Tuberculosis" as applicable to the prevention of disease. The mortality from tubercular diseases collectively had, he showed by tables taken from the report of the commissioners, undergone a progressive decline at all ages during the thirty years of sanitary and social progress inaugurated by the rise of public-health legislation in the sixties, the total reduction amounting to about 30 per cent. In the case of phthisis it is even greater, having for the most productive and procreative period of life reached no less than 50 per cent. of what it was forty years ago. This improvement had begun and advanced rapidly before the infectious character of tuberculosis was suspected, when it was held to be hereditary and the inevitable destiny of persons born of phthisical parents or cursed with the taint or diathesis. The lecturer expressed hope that the pulmonary form which had proved the most amenable to sanitary and social improvement may, in the not distant future, be almost extinguished; and while noting that tabes mesenterica among infants under one year of age has, far from diminishing, increased in the same period by over 21 per cent., he encouraged the belief that even more brilliant results than are possible in phthisis may be achieved in this form of the disease.

Among the causes that have directly or indirectly contributed to the reduction of tuberculosis in general, and of phthisis in particular, are the extension of drainage in town and country, and consequent drying of the soil, the better ventilation of houses and workshops, the lesser overcrowding, and the better food, clothing, and standard of living among the mass of the people. But infants and young children in general benefit by improved sanitary surroundings even more than adults, much of whose time is passed out of doors;

and it is clear that the cause of this exception to the general improvement must be sought in the different means by which the bacillus gains entrance to the body. In pulmonary tuberculosis the bacilli from dried sputa are inhaled with the dust, and if the public could be brought to realize the danger and the duty of abstaining from expectorating save into fire or water, phthisis might almost be abolished.

The mesenteric or intestinal form of the disease is set up by the ingestion of the living bacilli; it is rare in the adult except as secondary to phthisis—a self-infection through swallowing the sputa; the facts that adults do not suffer from it to any extent, and that infants do not eat meat, are sufficient, apart from the evidence of experiments, to show that this increase cannot be ascribed to the use of the flesh of tuberculous animals; but though mammary tubercle is extremely rare in the human female, it is frequently met with in the cow, when the milk sooner or later contains bacilli which rapidly multiply in it. Such milk might be taken with impunity into a perfectly healthy stomach; but infants—constantly liable when brought up by hand to gastro-intestinal catarrhs or other disturbances—are easily infected. There is no doubt that the number of infants fed throughout at the mother's breast is becoming less every year, and this increase of intestinal and mesenteric tubercle is concurrent with the increasing consumption of cow's milk. No doubt it could be taken with impunity if boiled, and this simple precaution would probably be the means of saving some 10,000 lives annually, or 12,000 at the least, if we include tubercular meningitis, which is, as a rule, secondary to tabes. Strict inspection of all cow-sheds, the enforcement of cleanliness, adequate ventilation, etc., and the gradual killing off of all diseased animals, with their separation meanwhile from the perfectly healthy, might well be undertaken by the authorities. But the lecturer believed that notification of tuberculosis in the case of man, with the consequent loss of employment, would be attended with disastrous results to the individual and indirectly to society, would lead to concealment and neglect of treatment while the disease is still curable, and would thus defeat the intention of the law. But the public should be educated in the etiology of tuberculosis and in the means for its prevention and cure, in the proper disposal of the expectoration of phthisical persons and the necessity for the sterilizing of all milk—at any rate of that employed in the feeding of infants; while the provision in every district of sanatoria for the treatment of cases of tubercular disease still capable of cure, and of hospitals for such as are hopeless and who, owing to their circumstances not permitting of the necessary degree of isolation, are a standing danger to their families, are in the highest degree desirable.

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PERIPHERAL NERVE TRANSPLANTATION,

WITH THE REPORT OF A CASE IN WHICH THE SCIATICS OF A DOG WERE TRANSPLANTED SUCCESSFULLY BETWEEN THE SEVERED ENDS OF THE MEDIAN AND ULNAR NERVES OF A MAN.*

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The operation of implanting between the resected ends of a peripheral nerve a segment of a nerve from a recently amputated limb or from one of the lower animals is comparatively rare. In the majority of cases of accidental impairment of the conductivity of a peripheral nerve the proximal and distal fragments can be brought together and directly sutured. Obviously this is the ideal method, and that, oftentimes, it is markedly successful may be seen from the reported cases of apparent primary union occurring after immediate suturing of the divided nerves.

In a certain proportion of cases, however, so much of the nerve-substance will be removed as to preclude all chance of a direct union of the divided ends of the nerve-trunk. This will happen more often during the removal of tumors involving a peripheral nerve. The same condition may result from an extensive crush of the nerve-substance, necessitating the resection of considerable portions of the nerve before healthy tissue is reached, or the injured nerve may be so embedded in dense connective tissue as to render a dissection at the point of the lesion exceedingly difficult and of doubtful utility.

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* Inaugural thesis read before the Chicago Academy of Medicine, May 13, 1898.

Under these conditions the surgeon must decide what method of bridging over the gap in the nerve-trunk and restoring its conductivity shall be employed. His choice will naturally depend largely upon the recorded results of other operators, including experimental as well as actual work on the human subject. Deductions from the cases of nerve transplantation will be rendered difficult from the small number recorded, from the meagreness of the reports and the absence of the very details needful to the settling of certain mooted questions.

To observe, treat, and record intelligently a case of nerve section requires a knowledge of nerve physiology and histology rarely possessed by the average surgeon. It is only by the combined efforts of specialists in these departments that such cases of nerve surgery can be worked out to the greatest advantage.

If the present paper shall prove to be of any scientific value I feel that it will be due largely to the assistance of my friend, Professor G. Carl Huber, of the University of Michigan, whose splendid work on nerve degeneration and regeneration is so well known.

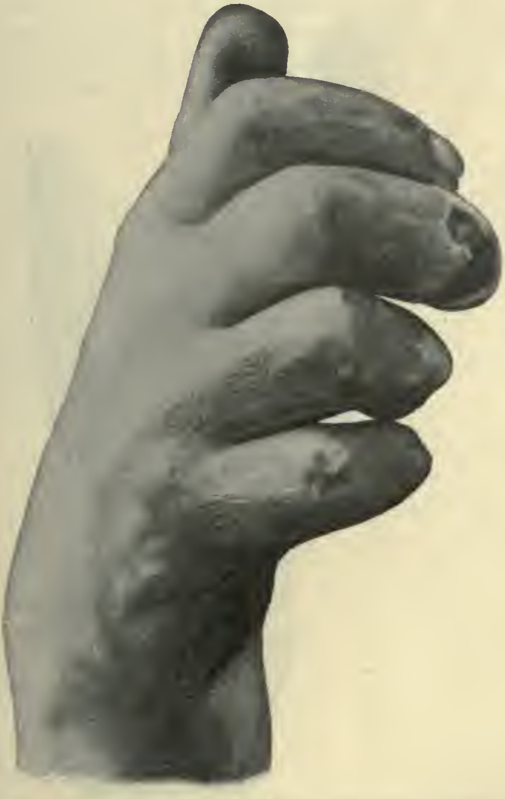
History of the Case. The patient, the report of whose case forms the basis of the present article, was referred to me by his brother, Dr. A. G. Graybill, of Caledonia, Mich., to whom I am indebted for accurate notes taken from time to time at my request.

N. G., male, aged twenty-four years, on May 17, 1896, sustained a severe injury to the right wrist by coming in contact with a circular saw, the cut extending transversely across the wrist and nearly to the bone. The ulnar artery and a number of the flexor tendons were severed and immediately sutured by the local surgeon, who assured the patient that the nerves were uninjured and that in time he would regain full use of his hand. The wound was dressed ten days after the operation and found to be suppurating. For a time the wound was dressed every day, and up to the time of consulting his brother, some four months after the injury, had not healed. The patient had no feeling in the hand, and at first complete loss of muscular movement. After awhile he was able to close his hand, but not well. Sensation did not improve, and his fingers began to draw upward, and he was unable to straighten them. Finally sores began to appear upon the fingers, and becoming alarmed he travelled many miles in order to place himself under his brother's care.

My first examination of the case was on September 21, 1896. The patient was a remarkedly well-developed and muscular man. About 7 cm. above the right wrist was situated an irregular cicatrix. On the ulnar side of the forearm it was depressed and adherent. There was a longitudinal cicatrix on the ulnar side of the forearm, extending from 2 cm. above the depressed cicatrix to the wrist. About 3 cm. above the wrist, over the normal site of the median nerve, was a superficial sinus, from which a small quantity of pus could be pressed. The flexor tendons were contracted and bound down by cicatricial tissue. (Figs. 1 and 2.) Accompanying this contraction was a flexure of the fingers which could not be overcome by passive motion.

The trophic changes in the hand were marked. It was distinctly colder than the left, its color dull red, surface smooth and glossy, and nails corrugated. There were a number of blebs the size of a pea scattered over the dorsal surface of the third and fourth fingers. A superficial ulcer, 1½ cm. in diameter, existed at the root of the nail of the third finger. (Fig. 1.) There was a marked atrophy of the small muscles of the hand, and the thenar and hypothenar eminences were considerably flattened. The interosseous spaces were also markedly furrowed. The hand could be closed only partially, there being inability to bring the finger-tips into the palm. Abduction and apposition of the thumb were impossible, an object in the hand being grasped only through the agency of the long flexors. Extension of the fingers was rendered doubly impossible by contraction of the flexor tendons and atrophy of the interosseous and lumbricales muscles.

FIG. 1.

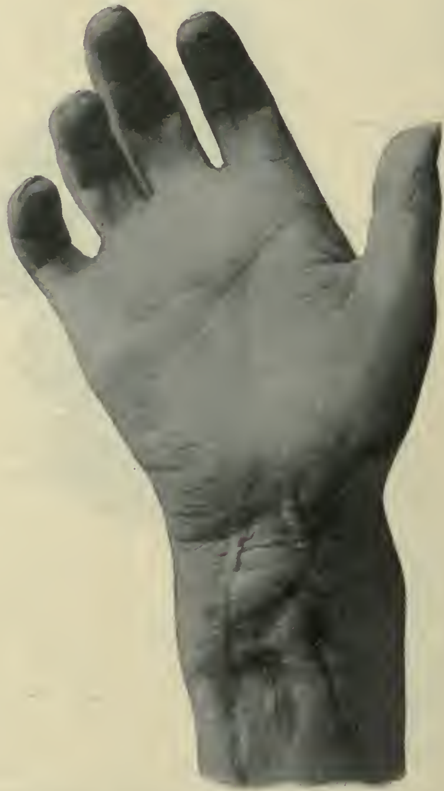


Showing trophic changes. Taken four days prior to operation.

The area of anæsthesia was tested by the induced current and by a pin-prick. There was absolute anæsthesia in the palmar surface of the hand, over all the digits and inner surface of the thumb. The ulnar side of the hand was anæsthetic. On the dorsal surface the skin was anæsthetic over the entire distal half of the first three digits, over the ulnar half of the proximal part of the third digit, and over the entire surface of the small digit and a corresponding area downward to the wrist. There was a small border of anæsthesia on the radial side of the proximal half of the first finger and the outer surface of the thumb. (Figs. 3 and 4.)

The patient was directed to return home and have the suppurating tract treated daily with peroxide of hydrogen until it was entirely healed, as it was considered useless to attempt anything operative upon the severed nerves save in a clean field. On October 17th, the wound having healed entirely, he was seen in consultation by Professors Herdman and Huber, of Ann Arbor. The former kindly subjected the hand to a very careful electrical examination, as follows: Examination with Waite & Bartlette high-tension induction coil, secondary in use, four interruptions per second, with secondary coil, carrying the primary to the extent of 25 millimetres. With a flat electrode one and a half inches in diameter at the back of the neck, and a pointed electrode over the nerves at the elbow-joint, responses were obtained from the left ulnar and median nerves. With electrodes in the corresponding position on the right arm it was necessary to move the secondary

FIG. 2.

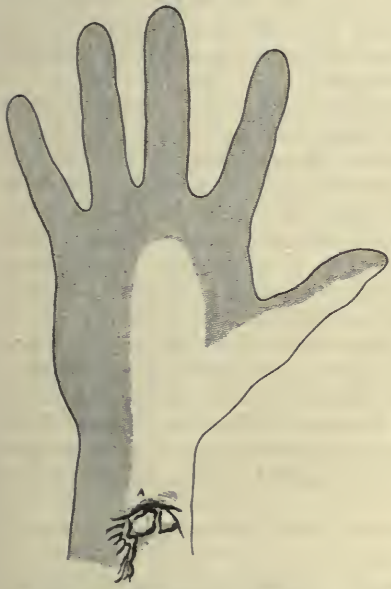


Taken two and a halt months after operation.

coil from 25 to 33 millimetres to obtain some response. With pointed electrodes on the nerves and muscles in the palm there was no response. The anæsthetic area was carefully noted by the induced current, and corresponds to that noted in Figs. 3 and 4. *Continuous current examination.* In muscles supplied by the median, a current of ten milliampères being used, the response was sluggish and wormlike. A. C. C. greater than C. C. C. The same condition existed for the muscles supplied by the ulnar. Reaction of degeneration, therefore, was shown to be present in the hand-muscles supplied by these two nerves.

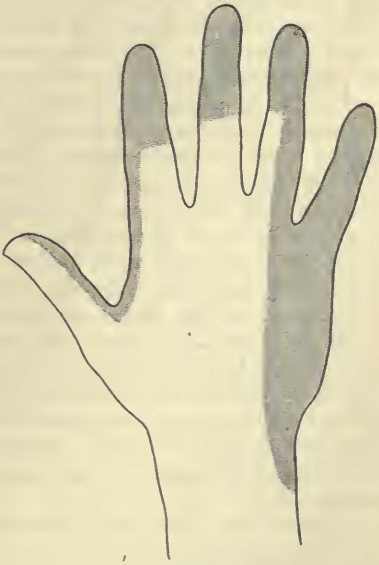
Operation, October 24, 1896, five months after the injury. At the time of the operation the trophic changes on the fingers were still marked, and rendered complete asepsis of the wrist somewhat difficult. The fingers were wrapped in iodoform gauze and cotton, but the wrappings became deranged at the time of the operation, and possibly accounted for the superficial suppuration of the wound over the median nerve.

FIG. 3.



Right hand, palmar surface, October 17. Anæsthetic area shaded. A. Location of scar.

FIG. 4.



Dorsal surface, October 17.

The hand was rendered bloodless by an Esmarch bandage, and an incision 7 cm. long was made over the normal site of the median nerve. (Fig. 2.) The flexor tendons were found to be very adherent and contracted. The cut median was located after a little searching. It was considerably thicker than the normal nerve, and its two ends were united by a small band of dense connective tissue. (Fig. 9.) The proximal end of the median ended in a hard bulb 2½ cm. in length and 2 cm. in width. In order to expose the nerve-tissue at the proximal and distal ends, and to get rid of all connective tissue, the bulb above and a portion of the nerve below were removed, the whole fragment, including the connective-tissue bridge, measuring 3½ cm. So much force was required to bring together the cut ends that it was decided best to fill in the gap with a dog's nerve.

A young black hound had been aseptically prepared, and 4 cm. of the right sciatic were removed and sutured between the resected ends of the median with kangaroo tendon. A fine curved needle was used, and two sutures passed ½ cm. away from the ends and carefully tied. The fascia was sutured over the transplanted fragment, and the flexor tendons loosened as much as possible. The skin was sutured with catgut, a few strands of silkworm-gut being used for drainage. An incision 7 cm. long was now made over the normal site of the ulnar nerve. Considerable difficulty was experienced in locating the incised nerve, from the fact that the upper fragment was joined to the distal fragment of the severed carpi ulnaris tendon. The distal end of the ulnar nerve was found lying slightly below and interior to the proximal end. The two ends were trimmed as in the case of the median, and 4 cm. of the left sciatic of the dog transplanted between the ends, as previously described. The fascia was sutured over the fragment with catgut and the incision closed in the same manner as was that of the median. A plain sterilized dressing was placed over the wounds and arm, and the hand placed in a posterior splint, the fingers being extended as much as possible and held in place by a bandage.

The day following the operation there was considerable oozing, and the dressings were changed, affording an opportunity of testing the anæsthetic area on the thumb. The other fingers, being bandaged and forcibly extended upon the splint, were not disturbed, and therefore their sensory areas were not tested. The test on the thumb was made with the point of a pin, the patient's eyes being closed. Comparison with the anæsthetic area, indicated in Fig. 3, according to tests made before the operation, showed a distinct return of the sensation over the palmar side of the thumb to the distal end of the first phalanx.

Three days after the operation the patient left the hospital and returned to Caledonia, where he was under the constant medical supervision of his brother, who made frequent and accurate notes of his condition. The wound was dressed for the second time on October 27th, and two days later a third time, when the median wound showed signs of superficial suppuration, although the temperature was normal, and so remained.

October 31*st*, seven days after operation, fourth dressing, ulnar wound healing by first intention. Several stitches over the median have given way. Considerable oozing from the line of incision. Splint omitted and fingers forcibly extended without much difficulty or pain. Sensation: Detects the prick of a pin over the palmar surface of the thumb as far forward as the second phalanx. Slight irritation of this area produces prickling sensation of the hand, extending up the hand and wrist to the wound.

November 1*st*. Detects the prick of a pin on the first finger, dorsal surface, to the root of the nail, and over the dorsal surface of the second finger to the middle of the second phalanx.

2*d*. Ulnar incision healed by first intention. Slight superficial suppuration in the median incision. Detects the prick of a pin over the entire dorsal surface of the third phalanx of the second finger.

4*th*. Detects prick of pin or pencil over the dorsal surface, palmar side, of the hand to the end of the second phalanx of little finger, and previously anæsthetic area of the ulnar side of the third finger to the end of the second phalanx. The hand is much warmer than before the operation.

6th. Sensation over the whole of the dorsal surface of the thumb to the nail on the palmar surface, and on both sides of the thumb sensation exists to within 2 cm. of the end of the thumb. Sensation over the dorsal surface of the first finger to the nail and on the sides and palmar surface to the end of the first phalanx. Sensation on the dorsal surface of the second finger and the ulnar side of the second finger to the end of the third phalanx. Over the corresponding area on the palmar surface of the same finger a pin-prick could be detected to the end of the second phalanx. There was no sensation on the ulnar side of the palmar surface of the finger. In the third finger sensation was good on the dorsal end of the first phalanx. On the dorsal surface toward the second finger there was partial sensation to the end of the second phalanx; sensory area of the dorsal surface of the little finger extended to the end of the second phalanx. No difference is to be noticed in sensation when a pin, pencil, or electrical current is used. Anæsthetic areas of the hand are colder than the sensory areas. No response of the muscles to the faradic current.

8th. Area in the palm of the hand which was distinctly sensitive to a pin-prick at a previous examination is anæsthetic to-day.

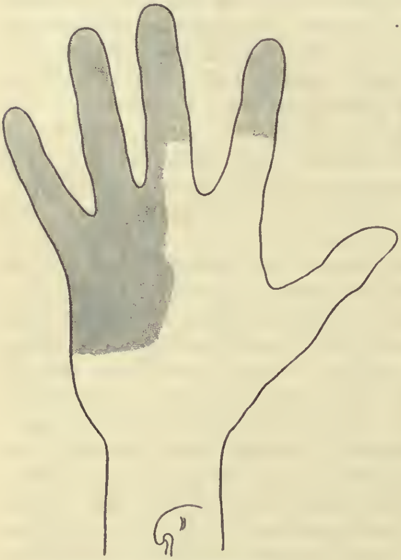
9th. Hand has a natural color on the dorsal surface, with the exception of the third phalanx of the second, third, and fourth fingers. Can almost completely extend the first finger. The ulcers have healed. There is a decided improvement in the muscular power of the hand. Can touch the dorsal surface of the second knuckle of the first finger with the end of the thumb. Can approximate the thumb to the end of the second finger easily, and to the third finger with some difficulty. These movements were hitherto impossible. Can abduct the thumb more daily. Can hold a tin wash-basin between the thumb and forefinger, while before the operation it was impossible to hold as light an object as a lead-pencil. Can detect degrees of heat and cold with the dorsal surface of the hand, a match flame being felt at a distance of two inches and heat from a stove at six inches.

The hand was treated daily with massage and electricity, and improvement in sensation and motion was very satisfactory. The changes in sensation have been noted on the charts.

December 31, 1896. There is a blister 1 cm. in diameter, and another one-quarter as large, on the palmer surface of the third phalanx of the first finger. The skin of the entire hand has lost its shiny look, and appears quite normal. The fingers have lost their puffy look. The nails are growing out and the ridges are disappearing. The improvement in the muscular power is very marked. The tips of the fingers can be closed into the palm. Opposition and adduction of the thumb improving, although adduction is impossible without flexion of the thumb. Can hold a pencil between the thumb and fingers so tightly as to require considerable force to withdraw it from his hand. The first finger can be nearly fully extended; the others are held by the contracted flexor tendons. There is still atrophy of the interossei and the muscles of the thenar and hypothenar eminences, although these depressions are much shallower than before the operation.

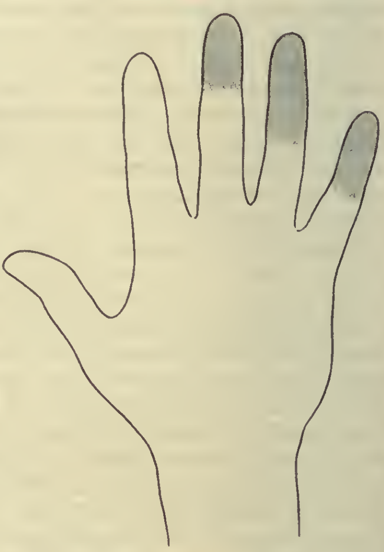
Patient left Caledonia for Canada, January 28, 1897. He was satisfied that he could earn his living by manual labor, and, with the exception of the contraction of his fingers, claimed his hand was as good as ever. His grip was strong, and he could perform such tasks as chopping wood. Sensation was complete over the entire dorsal surface of the hand excepting over the third phalanges of the second, third, and fourth fingers. The only remaining anæsthetic areas of the palmar side of the hand were over the second and third phalanges of the third and fourth fingers and the third phalanx of the second finger.

Fig. 5.



Palmar surface, November 8.

Fig. 6.



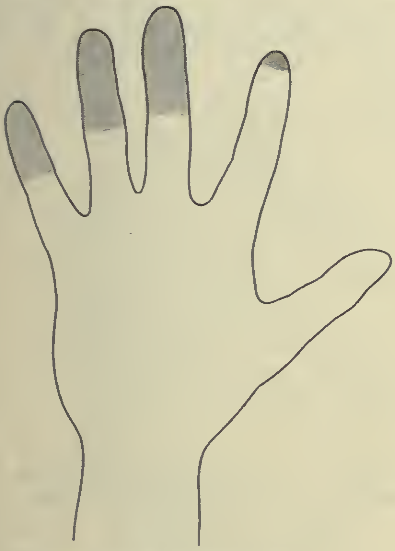
Dorsal surface, November 8.

He went to work in the saw-mill, and some time in February, 1897, unfortunately froze the right hand. He persisted in working, however, and one week later again froze the hand, this time so badly that the swelling extended half-way to the shoulder. Five months later the hand had practically returned to its condition at the time of the frostbite, with the exception of the extremities of the first and third fingers, where there were sinuses continually discharging pus. There was also loss of sensation over the last phalanx of the first finger, although this area had become sensory after the operation. Eight months after the frostbite the distal phalanx of the first finger was amputated and also the second and third phalanges of the third finger, the amputation wounds healing well.

The condition of the hand on January 1, 1898, was as follows: Sensation is complete in the hand, except a small area between the last joint and the nail on the dorsal surface of the second and little fingers. The palmar surface of the hand and fingers is sensitive to the slightest touch with a feather. Sensation of heat and cold as good as ever. Some atrophy of interossei and muscles making up the thenar and hypothenar eminences. Motion of the hand good and strong. From lack of exercise of the hand resulting from frostbite there was increased contraction of the flexor tendons, especially those of the little finger. Cannot adduct or abduct the thumb; neither can the fingers be separated or brought together.

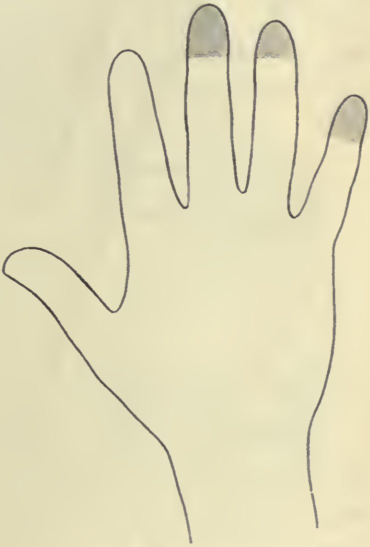
Under date of April 21, 1898, the patient writes: "My hand is good and strong, but my second finger is bothering me the same as the other two did. The hand is not filling out between the fingers. Sensation is good in the whole hand and fingers, except the dorsal surface of the second finger to the first joint. The end of the finger continues sore, and may have to have it amputated as far as the first joint. I am hard at work every day."

FIG. 7.



Palmar surface, December 31.

FIG. 8.

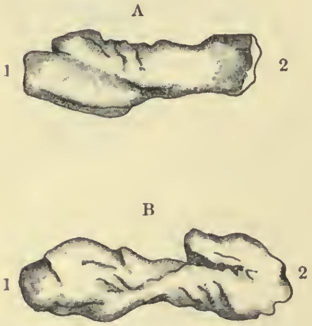


Dorsal surface, December 31.

Fig. 1 was taken before and Fig. 2 after the operation. The changes in sensation have been outlined in Figs. 3 to 8. Sensation was tested by means of a pin-prick. Careful comparison of the notes of change of sensation after the operation and the charted areas will show variations of the sensory areas, a part sensory at one time becoming anæsthetic at a subsequent date. This "vacillating sensation" will be considered later on.

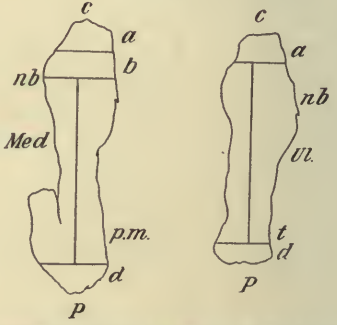
Microscopical Examination by Dr. G. Carl Huber of Segments of the Median and Ulnar Nerves Removed at the Time of the Operation. The segments removed from the median and ulnar nerve at the time of the operation (the size and shape of which may be ascertained in Fig. 9) were sent me in Müller's fluid. After thorough hardening in this solution and dehydration in alcohol the tissues were prepared for paraffin embedding by cutting them into several smaller pieces. The manner of their subdivision may perhaps be shown best by means of the accompanying Fig. 10, where *c* and *p*, respectively, are used to designate the central and peripheral end of *Med* (median segment) and *Ul* (ulnar segment); *nb*, the nerve-bulbs of median and ulnar central ends; *pm*, peripheral median, and *t*, a portion of the forearm tendon to which the ulnar was attached; *c*, a connective-tissue bundle uniting the bulbs on the peripheral end of the central median stump (*nb* in *Med* of figure) to the central end of peripheral median (*pm*, of figure), and the bulbs on the peripheral end of the central ulnar (*nb* in *Ul* of figure) to the tendon. The lines in Fig. 10 indicate the position and directions of the sections by means of which the segment removed from the median nerve was divided into five smaller pieces, the segment from the ulnar into four pieces. The pieces thus obtained were embedded in paraffin and sectioned, the sections varying from 8 to 15 μ. in thickness. It may readily be seen that in this way cross-sections of the central end of the median and ulnar segment, as also cross-sections of the peripheral median and the tendon attached to the ulnar (*a*, *b*, and *d*, of Fig. 10), and longitudinal section of the tissue between these respective cross-sections were obtained.

FIG. 9.



A. Ulnar nerve. 1. Proximal end; 2, tendon. B. Median nerve. 1. Proximal end; 2, distal end.

FIG. 10.



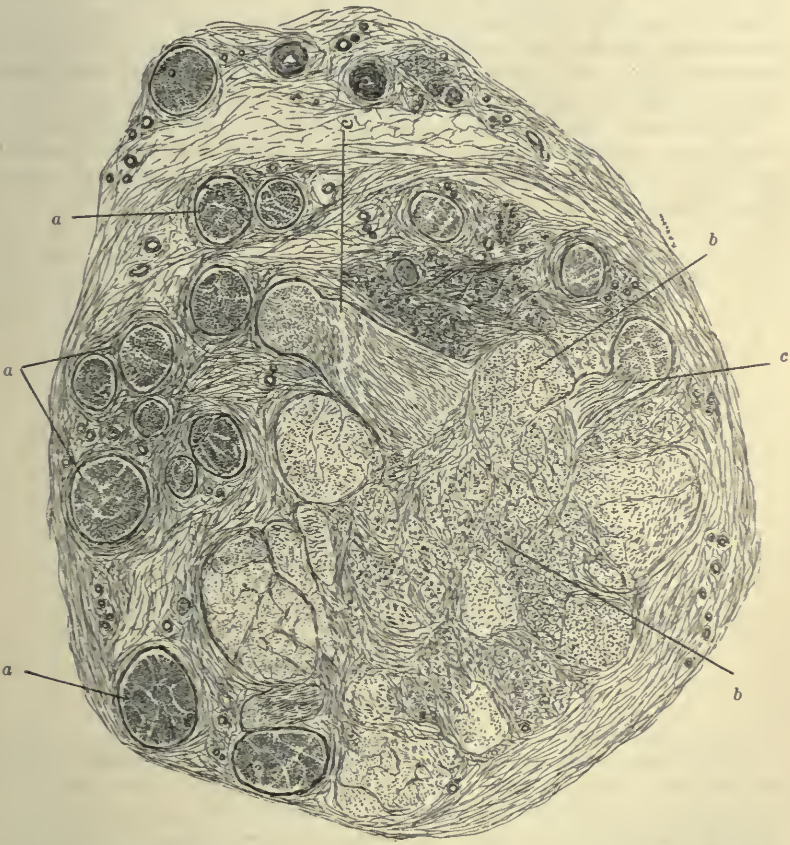
Median and ulnar segments, showing division into smaller pieces, as mentioned in the text.

The sections thus obtained were fixed to cover-glasses, the paraffin removed, and representative sections from each of the several pieces, obtained as above described, were stained after the following methods:

1. Hæmatoxylin, counter-stained with eosin.
2. Hæmatoxylin, counter-stained with picric-fuchsin.
3. Stroebe's anilin-blue-saffranin method for bringing to view the axis cylinders. For some unexplainable reason the sections stained in this way did not show with the usual clearness the axis-cylinder differentiation; with care, however, they could be distinguished from the surrounding tissue when the oil immersion was employed.
4. Weigert's hæmatoxylin stain as modified by Benda. It was found that this method could be used on sections cut in paraffin, the myelin staining in the well-known blue-black color. The paraffin sections, after fixation to the cover-glasses and removal of the paraffin, were placed from four to five days in Müller's fluid; were then impregnated with the iron salt (liq. ferri tersulphatis one part, to two parts of distilled water) for twenty-four hours, stained in 1 per cent. aqueous solution of hæmatoxylin for forty-eight hours, bleached in a ½ per cent. solution of permanganate of potassium, and finally in a 10 per cent. solution of

hydric sulphite, washed in water, dehydrated, cleared in xylol, and mounted in balsam. By the use of these several staining methods the general structure of the tissues was studied to some extent, and the development of new axis-cylinders and the myelation of the new fibres and the myelin of the old fibres were brought to view.

Fig. 11.



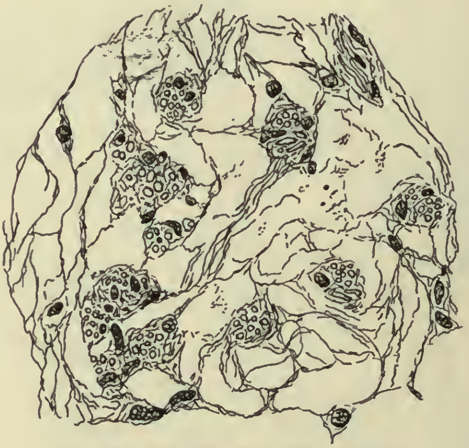
Cross-section of bulb on the peripheral end of the central median stump. Magnified twenty times; reduced about one-half. *a.* Normal nerve funiculi. *b.* Bulb-tissue. *c.* Nerve funiculi consisting of new nerve-fibres cut obliquely.

Microscopical Appearance of Sections made from the Segment Removed from the Median.

Cross-sections of the central portion of the median segment (*a*, of Fig. 10) show in all essentials the structure of a normal nerve-trunk, with this exception—the nerve funiculi are separated by a larger amount and by a more dense fibrous tissue—epineurium—than is the case in a normal nerve-trunk. The nerve-fibres in the funiculi present nothing worthy of special mention, showing in all essentials the structure of a normal nerve-fibre. Cross-section through the bulk of the central median (*b*, of Fig. 10) present, however, an entirely different appearance. One such section is reproduced in Fig. 11. As may be seen from this figure, one side of the section showed a number of normal nerve funiculi (*a*), each surrounded by epineurial sheath and separated by a rather dense epineurium. The greater portion of the section presents, however, a very characteristic structure—one which may be referred to as the structure of a nerve-bulb. In its most characteristic appearance (see *b*, of Fig. 11, and more highly magnified in Fig. 12) it presents a loose areolar connective tissue, in the meshes of which are seen small nerve-bundles, consisting of from two to ten and now and then as many as sixteen to eighteen small nerve-fibres, which have a more or less irregular wavy, tortuous, or spiral course, the individual nerve-fibres in these small bundles being often separated by a few connective-tissue fibres.

These small fibres consist of an axis-cylinder, and the majority of them have a very thin layer of myelin, and are beset with numerous nuclei; in short, they present the appearances of newly formed medullated fibres.

FIG. 12.

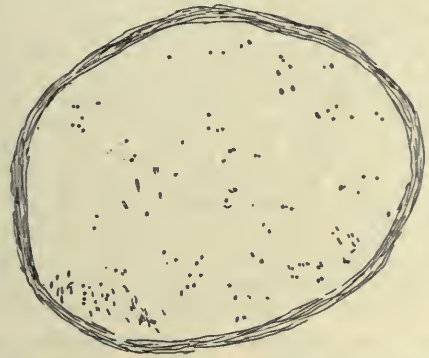


Bulb-tissue magnified about 900 diameters.

In a section passing through a funiculus of the nerve-trunk, central to the bulb, it may be seen that in that portion of the nerve funiculus which did not undergo degeneration the nerve-fibres are parallel and present essentially the structure of normal nerve-fibres. On reaching the beginning of the bulb-tissue the nerve-fibres assume the character of newly formed nerve-fibres (very small nerve-fibres, with only a thin layer of myelin and many nuclei); at the same time these smaller fibres begin to spread out fan-shaped, and sooner or later break up into small bundles, which are no longer parallel, but may be seen twining their way between the connective-tissue bundles of the bulb. Oftentimes large bundles are deflected from their course, as may be seen in the cross-section presented in Fig. 11, where at *c* such bundles are cut obliquely and longitudinally.

Peripheral Median. Cross-sections of the central end of the peripheral median present the following appearances: The nerve funiculi are separated by a relatively large amount of fibrous connective tissue which is much denser than the epineurium of a normal nerve-trunk. In preparations stained with hæmatoxylin and eosin or picric fuchsin all the nerve-fibres constituting these funiculi present the appearances of completely degenerated nerve-fibres — that is to say, collapsed sheaths of Schwann containing a small amount of the nucleated protoplasm. When, however, such cross-sections are stained in Weigert's hæmatoxylin it may be seen that here and there among the degenerated fibres some regenerated fibres, with a very thin sheath of myelin, are to be found. I have represented in Fig. 13 a nerve funiculus sketch from a cross-section of the peripheral median stained in Weigert's hæmatoxylin. In this figure only the medullated nerves are regenerated. The sketch was made with the aid of the camera lucida, and shows not only the number and arrangement of these small, medullated fibres, but also shows that while many are cut crosswise, others are cut obliquely, showing that some of these regenerated fibres in the peripheral median have an irregular course and are winding their way along paths of least resistance. In cross-sections of the peripheral median stained after the Stroebe method, here and there a small axis-cylinder may be made out. These sections show, therefore, that in the peripheral median a certain number of regenerated fibres are to be found among the completely degenerated nerve-fibres.

FIG. 13.



Cross-section of a funiculis of the peripheral median, stained in Weigert's hæmatoxylin. Only the medullated fibres are shown. Magnified about 250 diameters.

Longitudinal sections of the median segment (made as above described) present appearances worthy of more especial consideration. Reference has above been made to the structure of the peripheral and of the central median, namely, the nerve-bulb, consisting of newly formed nerve-fibres, many of which had a thin sheath of myelin grouped into small bundles and separated by an areolar connective tissue. Between this nerve-bulb and the peripheral median there is found a dense fibrous tissue (*c*, in Fig. 10). Into this connective tissue could be traced from the nerve-bulb small medullated nerve-fibres, well shown in Weigert's stained sections. They were found here and there in this tissue, either as single fibres or as small bundles of fibres, which could be traced into the peripheral median stump; and, while it was not possible in any one longitudinal section to trace a single newly formed medullated fibre, or a small bundle of such fibres, from the nerve-bulb on the peripheral end of the central median stump through the connective tissue intervening between it and the central end of the peripheral median and into the peripheral median, owing to the fact that these small medullated fibres do not follow a straight course, because they are compelled to wind their way through the organizing connective tissue, taking in this paths of least resistance between connective-tissue bundles, this would not go to show that the fibres found in the peripheral median did not grow into it from the central stump. Their arrangement in these longitudinal sections suggests this downgrowth very strongly, and may be interpreted as showing that some of the budding axis-cylinder processes of the central end had developed far enough toward the peripheral median to be able to grow through the connective tissue forming between the central and peripheral portion of the divided median, and thus reach the peripheral median. How far down in the peripheral median such fibres had grown at the time of the operation can only be conjectured.

Ulnar. The study of the segment removed from the ulnar loses in interest owing to the fact that the central end of the peripheral ulnar was lost at the time of the operation. As has been previously stated, the peripheral end of the central ulnar segment was, at the time of the operation, found united to one of the forearm tendons, to which it seems to have been sutured at the time of the injury. The segment of the ulnar sent me for examination consisted, therefore, of the peripheral portion of the central ulnar stump, firmly united by fibrous tissue to a short segment of tendon. Cross-sections of the central end of the ulnar segment (*a*, of Fig. 10) presented appearances very similar to that described for the central median segment and shown in Fig. 11, and need, therefore, no further description. Cross-section of the peripheral portion of the segment removed from the ulnar (*c*, of Fig. 10) shows, for reasons above given, the structure of the tendon. Longitudinal sections of the ulnar segment (along the line shown in Fig. 10) show the ulnar ending in a large nerve-bulb, which was intimately united to the tendon by means of fibrous tissue. In none of these sections was I able to trace any newly formed nerve-fibres beyond the nerve-bulb, the dense structure of the tendon to which the ulnar was probably sutured at the time of the injury preventing the downgrowth of the axis-cylinders from the central ulnar stump.

Microscopical Examination of Amputated Fingers (by Dr. G. Carl Huber). The tips of the two fingers, the third phalanx of the first finger, and the second and third phalanges of the third finger were sent me in alcohol. Pieces from various places in the amputated fingers were embedded in paraffin, sectioned, and the sections fixed to cover-glasses and stained in hæmatoxylin and eosin-hæmatoxylin and Van Giesen's picric acid, acid fuchsin solution, hæmatoxylin, and orange G. Attempt was also made to stain them after Weigert's hæmatoxylin method and some of the methods for differentiating the axis-cylinders in the nerve-fibres; but, owing to the fact that the tissues were hardened in alcohol and not in a chrome salt, these latter methods did not prove satisfactory.

In sections prepared after the above methods it may be seen that the tissues other than the nerve-fibres and end-organs to be mentioned, present, as far as may be determined, a normal structure. Epidermis and sweat-glands are all normal, as is also the dermis. Yellow elastic tissue, as shown by the orcein method, is normal in amount and distribution. The great majority of the vessels present no deviation from the normal structure, with the exception of one of the digital arteries found in the volar side of the third finger. This vessel, as seen in cross-section, presents on one side a very much thickened subendothelial coat. The nerve-trunks, both palmar and dorsal, as also the smaller branches here and there met with, present at first sight the appearance of completely degenerated nerves. The epineurial tissue is thicker and denser than in a normal nerve of the same size. The same is true of the perineurium surrounding the several funiculi. The structure of the nerve-fibres is most clearly seen in a number of small branches cut obliquely in for a short distance longitudinally. In these sections it may be seen that such degenerated fibres consist of a very small amount of homogeneous protoplasm in the form of a thread or very delicate band surrounded by a very delicate sheath. In the course of these fibres, rod-shaped or spindle-shaped nuclei are met with at intervals of about 75 to 100 m. In cross-sections such degenerated fibres present the appearance of a very small tube filled with a homogeneous substance. They are separated in the funiculus by a small amount of fibrous connective tissue. Among the degenerated fibres a few somewhat larger fibres are met with which measure about 5 m. in diameter. These fibres consist of a delicate sheath filled with a homogeneous substance. Sections were stained after the Weigert hæmatoxylin method as modified by Benda, in order to determine whether these larger fibres possessed a medullary sheath. In none of the sections made were medullary fibres found. Neither was I able to make out with any degree of certainty an axis-cylinder in any of the larger or smaller fibres. In qualification of the above statements it should be stated that as these tissues were hardened in alcohol, and not in one of the chrome salts, it is very probable that neither the Weigert method nor the special methods for staining the axis-cylinder were of any value in determining whether a medullary sheath was present or absent in the nerves examined. Negative results where these methods cannot be followed are of very little value. Mention may be made of the appearances of a number of Paccinian bodies seen in the sections. These nerve-endings were normal in structure except that no nerve-fibres could be made out in the core.

While it is not within the scope of this paper to discuss exhaustively the different views which have been advanced in explanation of the process of regeneration of peripheral nerves, in order to interpret intelligently the various phenomena presented by the case under consideration, it will be necessary to state briefly the main theories entertained regarding the manner of the regeneration of a divided nerve. I would refer those desiring a more exhaustive discussion of the subject to a recent article by Kennedy,[1] whose bibliography is quite complete.

In the article referred to, Kennedy divides the views of the histologic process of regeneration into two groups:

1. The view established by Ranvier,[2 3] and closely coinciding with that of Waller, that the peripheral segment of the nerve takes no part in the process of regeneration, but that the latter is effected entirely by growth of the new axis-cylinders from those of the central end of the nerve, the peripheral segment acting merely as a guide or growth to the end-organs. This view is widely accepted, and is supported by the

histogenetic researches of Kölliker[4] and His.[5 6 7] It has been recently supported by Howell and Huber,[8] Stroebe[9] and Notthafft,[10] who, however, find that the envelopes of the axis-cylinders are supplied from elements in the peripheral segment.

2. The view that the new fibres are derived from elements in the distal segment, and that the young fibres thus formed become attached to the fibres of the central end, and thus restore conductivity. Recently Bunger " has adopted this view, and holds that the young fibres are derived from the protoplasm and nuclei of the interannular segments. These form spindle-cells which unite end to end and form protoplasmic threads, which soon show longitudinal striation, the beginning of the axis-cylinder. The new myelin sheath is formed from the outer layer of the young fibres and also partially by absorption of the old myelin. The old sheath of Schwann disappears and the new is derived from the endoneurial tissue. The nuclei of the new sheath of Schwann are the direct descendants of the nuclei of the old, and have clearly the value of neuroblasts. This view coincides with the histogenetic researches of Balfour[12 13] and Milnes Marshall."[14]

According to the first view, every nerve-trunk, when divided, undergoes certain characteristic degenerative changes, consisting of segmentation of the myelin and axis-cylinder, a proliferation by means of a mitotic cell division of the interannular nuclei and the protoplasm surrounding these nuclei. Concurrent with the segmentation of myelin and axis-cylinder there goes on an absorption of the resulting fragments. As a result of these changes there remain only the collapsed sheaths of Schwann, containing a narrow band of nucleated protoplasm. These degenerative changes occur in the entire portion of every divided nerve-trunk, no matter how quickly or how accurately the divided ends are coapted.

The peripheral end of the central portion of the divided nerve undergoes the same degenerative changes to the extent of about ½ to 1½ cm., depending somewhat on the nature of the injury. Following immediately on these degenerative changes, regenerative changes begin to make their appearance. This regeneration of the divided nerve takes place from the central undegenerated end as outgrowths from the undegenerated young axis-cylinders. If the mechanical conditions be favorable, the peripheral degenerated portion of the nerve is subject to regeneration. In case the injured nerve is sutured soon after severance of its continuity, or when, from the nature and position of the injury, the ends of the divided nerve do not contract much, embryonic connective tissue developing between the severed ends forms only a relatively unimportant layer through which the down-growing axis-cylinder may penetrate and finally reach the degenerated distal nerve-trunk. If the embryonic connective tissue be for any reason denser, the small bundles of down-growing axis-cylinders meet with resistance in their attempt to reach the peripheral end of the divided nerve, become tortuous and deflected upon themselves, and the so-called bulb-tissue is formed.

Transplantation of a peripheral nerve between the ends of a divided nerve is a surgical attempt to prevent the formation of dense connective tissue and to provide a path of least resistance for the down-growing young axis-cylinders. The microscopical researches of Huber[15] tend to prove that a transplanted nerve is superior to catgut strands (Assaky[16]) or tubular sutures (Vanlair[17]) as a path for the down-growth of the axis-cylinders.

Necessarily these conclusions were arrived at from entirely experimental studies. Whether they will apply as well to the human subject can be determined only by a careful study of a considerable number of cases of nerve transplantation. From the favorable result obtained in the present case, and from a consideration of nineteen additional cases of nerve transplantation I have been able to collect, I believe that the operation has a distinct place in surgery.

A consideration of the changes in sensation and motion following the operation in the case just reported reveals many interesting phenomena. The first return of sensation in a previously anæsthetic area was noted within twenty-four hours after the operation, sensation being tested on the thumb by a pin. Tests made in this way are not open to the objection of those made with a blunt object, for by the latter method, as pointed out by Létiévant,[18] impact against the anæsthetic area may be carried to sound papillæ and carried upward by other nerves. This rapid return of sensation is not an uncommon occurrence, as recorded cases of nerve section and suture reveal. As it is generally conceded that the transplanted nerve segment degenerates, as does any other resected nerve, only more rapidly, it is contrary to all biologic law to suppose that sensation is so quickly conveyed over this bridge of foreign tissue. Yet this rapid return of sensation is advanced as an argument by those who claim that the fibres originate in the peripheral end from the sheath of Schwann. Thus Kennedy,[1] in speaking of the rapid return of sensation after operation, says:

"Cases in which sensation remains totally lost before operation and long after date of section of the nerve, but returns in a few days after the operation, cannot be explained on the theories mentioned (slow process of regeneration from the central end), and must indicate a reunion of the nerve and re-establishment of conductivity."

That there is fallacy in this reasoning is seen by such cases as the one reported by Vucetic,[19] in which there was great improvement in sensation and some in motility six hours after 15½ cm. of the right median nerve were excised and the resected ends not brought together. There certainly was no question of the re-establishment of conductivity in this case; yet the sensation returned in the previously anæsthetic area. These facts would lead us to suppose that Vanlair[17] and others are right when they contend that rapid return of sensation after nerve section or a secondary operation must be due to anastomosing nerve-fibres or to supplementary supply. It is probably not true that a single area of skin is supplied by one nerve alone. A number of facts would tend to show that there is a rich microscopical collateral nerve-supply which, under normal conditions, is not called into action, but under other conditions may alone be the carriers of sensation. The case of Richet,[20] where there was entire division of the median and no loss of sensation in its territory, and that of Létiévant,[18] who found, a month after the injury, no loss of sensation following division of the median and ulnar, show that the accepted distinction of motor and sensory nerves is not always constant. Weir Mitchell[21] has recorded a number of similar cases, among them the remarkable case of Nott, "who removed a large cyst from the flexor surface of the forearm, and with this tumor five inches of the median nerve, and yet the function usually assigned to this nerve was not interfered with in the slightest degree."

If, then, there be nerve-tracts to a given area other than those whose conductivity has been destroyed, why do not these tracts functionate at the time of the nerve section? It would seem as if irritation of the nerve at the point of lesion, and its consequent inhibitory action through the agency of the spinal cord on other peripheral nerve-fibres, must play an important causative part in the production of the phenomena. Experimentally, this inhibitory action of an irritated nerve has been shown to exist. Hence it seems perfectly plausible that the same effect may be produced by an injury to a peripheral nerve. This irritative inhibitory influence will continue in most cases, and distinct anæsthetic areas will be the result. The irritation being relieved by operation and the inhibitory influence removed, sensation conveyed through other tracts is the immediate result. In some such way as this must the early return of sensation be explained.

A study of Figs. 3 to 8 shows that from October 17th to November 8th, a period of twenty-two days, the return of sensation was relatively more rapid on the dorsal surface of the hand and in the neighborhood of parts supplied by the radial. On the palmar surface it will be seen that the return is much greater on the outer side of the hand in close proximity to fibres of the radial than on the ulnar side. This period—twenty-two days—is evidently too short for return of sensation from the down-growth of axis-cylinders, and must be explained by transmission of sensation through other tracts, the inhibitory influences of the irritated central nerve-ends having been removed by the operation. In the next period, however, from November 8th to November 29th, twenty-one days, we see a relatively greater progress in sensation on the ulnar side of the palmar surface of the hand. This may be due partially to the down-growth of axis-cylinders and partially to collateral nerve-supply. How much is to be ascribed to each it is impossible to say. The increase of sensation on the dorsal surface of the hand during this period is very slight, and the axis-cylinders evidently have not reached the anæsthetic areas in their downward growth.

In the third period—November 29th to December 31st, thirty-two days—the progress of sensation on both palmar and dorsal surfaces has been relatively much slower than during the first two periods. This corresponds with the facts noted in other cases I have critically reviewed.

It is very graphically shown by the charts that the improvement in sensation is toward the finger-tips, and it may be noted in passing that this is an argument in favor of regeneration from the central and not the peripheral end. If regeneration of the axis-cylinders arises from the sheath of Schwann, and maturation of the fibres is completed when the central and peripheral ends are united, the new fibre should functionate throughout its entire length at the same time, which is not the case.

Particular attention is called to variations in sensation occurring during very short periods of time. For example, it is noted on November 8th that a previously sensory area in the palm was on that date anæsthetic. A number of other instances can be found by carefully comparing the notes with the charts. The explanation of this "vacillating sensation" may lie in the changes in nutrition occurring in the cells surrounding the nerve-endings. This has been shown repeatedly in physiological experiments where changes of nutrition in a muscle will produce the greatest variabilities in sensation. For the same reasons variations in muscular power may be expected, and while none were noted in the present case, Dr. Ferguson informs me that variations in the motor power were very marked in his case of nerve transplantation.

While the nutrition of the hand improved rapidly after the operation, it was by no means normal at the time the patient left this country to resume his work in Canada, and the freezing of the hand and subsequent amputation of two fingers were the result. This was unfortunate, as undoubteldy he eventually would have recovered sensation in the entire hand.

The improvement in motility is also very interesting. The saw cut, it will be remembered, was just above the wrist and below the muscular branches of the median, given off to all the long flexors of the forearm, except the flexor carpi ulnaris and half the flexor profundus digitorum, which are supplied by the ulnar. Hence the motor supply to these muscles was not interfered with, although the movements were not free, owing to the injury to the flexor tendons. The actions of the extensor muscles were not interfered with. There was complete paralysis of the small muscles of the hand supplied by the median and ulnar nerves.

The first improvement in motion is noted as occurring between two and three weeks after the operation. At this time the patient was able to hold a tin wash-basin between the thumb and forefinger, although before operation it had been impossible to hold a lead-pencil between the same fingers. Opposition and adduction of the thumb is also noted as improving. This improvement in motion is more than can be explained by the freeing of the flexor tendons from adhesions at the time of the operation All the small muscles of the hand being paralyzed by the section of both ulnar and median nerves, the improvement in motion cannot be explained by vicarious movements of neighboring muscles which have not lost their nerve-supply (Létiévant[22]). The two possible exceptions to this might be the long flexor of the thumb and the extensor metacarpi pollicis. The latter muscle is innervated by the posterior interosseous, and therefore was uninjured in the present case. Its action is to carry the thumb outward and backward from the palm of the hand, and hence it is often called the abductor longus pollicis. But abduction of the thumb is not noted as improving at this time, although opposition and adduction are. Both these motions may be explained in part by the increased action of the long flexor of the thumb after the operation.

Unfortunately, careful electrical examination was not possible after the operation. When the first improvement in motion was noted the muscles failed to respond to faradic stimulation, the action of the galvanic current not being tried.

Two months after the operation the muscular power of the hand had markedly increased. The ends of the fingers could be flexed into the palm and an object be grasped through flexion of the knuckles. This motion is through the action of the interossei combined with the long flexors. Opposition of the thumb had increased markedly as had adduction, although the latter movement was still impossible without flexion of the thumb, and may in a large part have been due to the action of the long flexor. The atrophy of the small muscles is noted as diminishing, though still quite marked. The improvement of motor power in the whole hand was most marked, and in another month the patient declared it as well as ever, and went back to work. While this may have been true from the patient's stand-point, from a scientific point of view it was far from true; for over one year afterward the finer movements of the small muscles of the hand, such as abduction and adduction of the fingers (interossei) and adduction and abduction of the thumb without its flexion, are still impossible. There is also wasting of the smaller muscles of the hand. This shows that the action of the hand, as a whole, cannot be taken as a test of return of motility to individual formerly paralyzed muscles. As suggested by Kennedy, after five months' separation from their trophic centres the muscles may never be able to resume their normal functions, although the regeneration of the nerves down to the muscles may be complete. It must also be borne in mind that owing to the frostbite the patient was unable to use his hand for over eight months, and this probably had a marked effect in preventing the already atrophied muscles resuming their normal size and function.

After a careful search I have been able to add seven cases of nerve transplantation to the thirteen collected by Huber.[15] Two of them (18 and 19) are unpublished cases, the notes of which were kindly furnished me by Drs. White and Ferguson. Huber collected in all fourteen cases; but his fourth case by Tillmanns must be rejected, as it was one of flap suture instead of transplantation. How the error arose seems to be uncertain, but the quotation from Bowlby[23] possibly explains where it originated. Neither in Tillmanns's communication to the German Surgical Society, April 11, 1885 (*Berliner klin. Wochenschrift*, 1885, p. 375), nor in his article on the subject of loss of nerve-substance in Langenbeck's *Archiv*, 1885, vol. xxxii., where it was reported in detail, is anything said about nerve transplantation in this case.

As showing the ease with which errors may arise in collecting cases from the literature, it is only necessary to mention the one discovered in going through the eleven cases of nerve transplantation mentioned by Spijarny.[24] This author reports among his eleven cases three by Albert. This must be reduced to two, as it is evident that the first and second refer to the same operation. Spijarny's quotation is evidently taken from Wolberg[25] in the first case, the latter publishing in full and giving the proper date, 1876. Albert's[26] one publication of the same operation furnishes the second one as given by Spijarny. That this is so is also sufficiently evident from the fact that Albert, communicating with Wolberg, would not have omitted it in his statistics.

Probably there are other cases of nerve transplantation buried in society reports, but as far as lay in my power I have endeavored to make the list complete. By private communications I was enabled to obtain later reports in Lange's and Bradley's cases. The number of cases is few and the value of a summary correspondingly small, but I believe it will be useful even if it be only to call attention to the lack of details characteristic of most of the cases.

TABULATED LIST OF 20 CASES OF PERIPHERAL NERVE TRANSPLANTATION.

No.	Operator and where reported.	Nerve operated upon and nature of injury.	Primary or secondary operation.	Distance separating central and peripheral segments.	Method used to overcome the nerve defect.	Results.
1	Albert Einige Operationen an Nerven. Wiener med. Presse, No. 39 und 41, 1885, Jahrgang 26.	Man, aged 40. Right median in forearm; result of removing sarcoma of the nerve. Had previously had fairly good results from paraneurotic catgut suture, but tumor reappeared, and this was second operation.	Primary.	3 ctm.	Implantation of a nerve obtained from an amputat'd foot; catgut suture above and below.	Patient observed ten days; wound healed; no further observation; no results as regards sensibility and motility.
2	Albert. Ibid.	Farmer, aged 61. Had enlargements on several nerves, which were supposed to be of sarcomatous nature. June 11, 1881, one of these was removed from right ulnar near elbow.	ry.	10 ctm.	Implanted 10 ctm. from post. tibial taken from an amputated leg. Sutured with catgut.	June 17, 1881. The implanted segment came away in a necrotic state.
3	Kaufmann. Eine Nerven-Transplantation. Corresp. Blatt f. Schweizer Aerzte, March 15, 1882. Revue des Sciences Médicales 1884, T. 24, p. 305.	Musculo-spiral nerve was sectioned during operation on necrosed humerus; the nerve was later exposed, the ends vivified. Owing to anchylosis the ends could not be brought together. Typical musculo-spiral paralysis.	Secondary.	4 ctm.	Dog's sciatic implanted; silk suture used.	Operation was followed by fever; the result could not be determined at the time the report was given; no further observation made.
4	F. Lange. Verhandl. d. deutsch Gesellsch. f. Chir., Berl., 1882, xi p. 55.	Musculo-spiral. Four inches of nerve removed in operation for neuroma, from where it leaves axilla to where it turns behind humerus.	Primary.	4 inches.	Four inches of dog's sciatic inserted between resected ends of nerve.	Wound healed; results negative as to function. In private communication, dated April 14, 1898, Dr. Lange writes: "Paralysis remained permanent; about one year after the operation I saw the patient again with an eruption of multiple neuromata, and I have no doubt that he eventually must have succumbed to the disease, which showed an unmistakably malignant character."
5	Gersung. Rep. by Damar Harrison. Trans. Clin. Soc. London, 1892, vol. xxv.	Median. Removal of neuroma just above annular ligament.	Primary.	6 ctm.	Six ctm. of the sciatic removed from a rabbit engrafted.	Sensation began to return in two months; return of muscular movement not recorded; no further tendency to neuromatous degeneration; had before repeatedly suffered from this.
6	Vogt. Mittheilungen aus der Chir. klin. z. Griefswald, Urban u. Schwarzenbnrg, Wien, Liepzig, p. 122.	Musculo-spiral in upper arm. Gunshot wound.	Secondary, 1¼ years after injury.	8–10 ctm.	The defect was bridged by 12 ctm. taken from the two sciatics of a dog.	Suppuration followed; two months after the operation the nerve did not conduct impulses.

7	Mr. Mayo Robson, Clinical Society of London, Friday, June 5, 1889. Brit. Med. Journ., 1889, vol. i. p. 244.	Girl, aged 14. Median, right side just above annular ligament. Patient had a tumor just above annular ligament; this was easily separated from the surrounding cellular tissue, but was inseparably blended with a cord to which it was attached. The cord was severed and tumor removed. After recovering from anæsthetic, patient had complete anæsthesia of the portion of hand supplied by median. Microscopical examination proved the cord to be composed of nerve fibres.	Secondary, 48 hours after operation.	2½ inches.	Implantation of a post. tibial nerve which had been removed from a leg amputated by Mr. Ward. The nerve was carried from one amphitheatre to another in warm carbolic acid solution; a segment of suitable length was taken and placed between the ends of the resected median, and sutured above and below by a direct catgut suture.	Thirty-six hours after the implantation, sensation had returned to the extent that touch with a pencil could be localized. Five weeks later the sensation was so perfect that the slightest touch could be localized. At this time there was manifest diminution of the abductor and flexor brevis pollicis; however, they were not completely paralyzed.
8	Dr. H. Landerer. Einheilung eines Kaninchen Nerven in einen Defect des Nerven Radialis. Deutsche Zeitschrift für Chirurgie, 1888, vol. xxviii. p. 604.	Woman, aged 18. Musculo-spiral nerve. Patient had acute phlegmon of upper arm 1½ years before this operation; ¾ of a year after the beginning of the disease, several sequestra were taken out, the fistula united by incision, and no doubt a segment of the radial removed. Total musculo-spiral paralysis.	Secondary. more than ½ year after removal of sequestra nerve was exposed.	3½ ctm.	Implantation of rabbit's sciatic; piece 4½ ctm. in length placed between the ends of radial, not sutured to the nerve, but held in place with several buried catgut sutures.	Wound healed by first intention; three weeks after implantation electrical stimulation above and below gave contraction of muscles; methodical electrical treatment was now begun; ten weeks after operation the patient was shown to the Leipzig Medical Association, and at that time could elevate the hand to the horizontal position even against some pressure. Landerer adds: "Diese Thatsachen scheinen mir eine andere Deutung kaum zuzulassen, als dass in der That das fremde Schaltstück wenigstens f. einige Zeit erhalten blieb und nervöse Erregungen zu leiten vermochte. Später wird es natürlich von eigenen Nerven-Fasern durchbrocken."
9	Mr. Ward. Remarks on Nerve Grafting. By Edw. Atkinson. Brit. Medical Journal, Sept. 13, 1890, vol. ii. p. 624.	Laborer, aged 42. Median nerve. July, 1888, patient was operated upon for painful tumor just above internal condyle of right arm. On cutting down, tumor was found to be surrounded by median, out of which it could easily be shelled. Nov. 1888, patient returned with similar growth in the same location. Jan. 1, 1889, this with 1¾ in. of the nerve was removed. Paresis of hand and forearm, intention tremor, darting pain before operation.	Primary.	1¾ inches.	2½ inches of a median nerve taken from an amputated arm were implanted and sutured with fine catgut.	Jan. 12. Numbness and tingling over the whole limb. Jan. 20. Wound healed. Feb. 2. Slight thickening along the course of the nerve; no pains; stated that fingers are cold, but feel warm; thumb and index finger very weak; hand looks wasted, especially the thenar muscles. July 26, 1890. Slight degree of wasting of the forearm; thenar eminence almost entirely absent; sensation normal to wrist; below, dull over the median area; movement of index and middle fingers normal in range, though weak; movements of the thumb limited to flexion, extension, and abduction; adduction and opposition entirely wanting.

No.	Operator and where reported.	Nerve operated upon and nature of injury.	Primary or secondary operation.	Distance separating central and peripheral segments.	Method used to overcome the nerve defect.	Results.
10	Mr. Mayo Robson. Remarks on Nerve Grafting. By Edw. Atkinson. British Medical Journal, Sept. 13, 1890, vol. ii. p. 624. Later report Brit. Med. Journ., Oct. 31, 1896.	Ulnar and median. Silk dresser, aged 29. 7 months before seen, patient fell on a scythe and received a deep cut on inner and lower part of right arm. At the time of admittance there was loss of sensation and motion in parts below injury supplied by median and ulnar.	Secondary. about 7 months after injury, Jan. 30, 1890.	Ends of median 2 inches apart after vivifying stump.	Ulnar nerve was sutured; internal cutaneous (?) was also found divid'd, and was sutured to the ulnar; 2 in. of the spinal cord of a rabbit implanted between the ends of median, and held in place by sutures.	Feb. 7. Patient can feel the scratch of a pin on flexor aspect of first phalanx of thumb, also at the root of index finger; can also tell when a hair located on the first phalanges of little and ring fingers is pulled, but cannot feel the scratch of a pin in these regions. March 4. Sensation in the palmar surface of hand supplied by median, and creeping along the fingers. No marked improvement in ulnar region. Apr. 1. Flexors of forearm all respond to kathodic closing current; muscles of the thenar eminence do not react on faradization. April 30. Sensation returning on the back of ring finger; voluntary flexion of wrist and fingers beginning to be possible. June 13. Nutrition of hand much improved; patient can pick up small objects; no sensation in area supplied by ulnar. Later report, March, 1891, resumed work. Exam. Feb. 1896. Left arm only ⅛ in. larger than right; muscles completely restored, movements almost as perfect in right as in left arm; only weak muscle was adductor of thumb which had no perceptible power; sensation completely restored.
11	Edward Atkinson. Ibid.	Sciatic nerve. During operation for gluteal abscess 1 inch of the sciatic was removed.	Primary.	1 inch.	Immediately the exsected portion of the sciatic was again implanted and sutured in place with catgut sutures.	Complete anæsthesia of the limb the day after the operation; five days later sensation began to return to the toes; sixteen days after the operation the child could localize the touch of a pin-point anywhere on the limb.
12	Edward Atkinson. Loc. cit.	Miner, aged 22. Ulnar nerve. Laceration wound of right forearm. Ulnar artery and nerve, flex. sub. dig., flex. carp. ul., and palmaris long. were torn. Ends of ulnar free in the wound. Ulnar paralysis.	Primary.	2 inches.	2½ in. taken from the two sciatics of a rabbit implant'd and sutured with a single suture above and below to the ulnar; muscles sutured and wound closed.	Five days after the operation, on removing the dressing, the skin flap was under great strain; a stitch was removed, allowing the escape of a large quantity of a brownish, blood-stained pus; the wound was irrigated, and salicylic wool applied Eighteen days. Sensation beginning to return in ring and little fingers. Twenty-five days. Wound closing; sensation increasing; some return of muscular power is noticed. July 24, three months after operation. Sensation complete in all fingers, except the last two phalanges of little finger; all fingers except little finger can be flexed on the palm.

13	Damar Harrison. A Case of Nerve Grafting. Transactions of Clinical Society of London, 1892, vol. xxv.	Boy, aged 13. Median. Eleven weeks before admission a large glass plate fell on his wrist and divided all the tendons except flex. carp. ul., and the median nerve. At that time the structures were sutured; suppuration and sloughing ensuing. At the time of admission the hand was cold, skin glossy, and muscles atrophied. Flexor tendons were matted together. There was loss of sensation and motion in the median area.	Secondary, 11 weeks.	2 inches.	2 in. were taken from the sciatic of a kitten and sutured between the ends of median with catgut; fingers were straightened and flexor tendons separated.	Wound healed by first intention; forty-eight hours after operation prick of pin could be felt in palm of hand and over the first phalanx of thumb. Three days, pricking felt over the thumb and first phalanx of index and middle fingers; nutrition improved at the end of 2½ to 3 months. Eight months after operation he can abduct the thumb and oppose it to index finger; flexion of fingers on palm is not perfect.
14	Mitchell Banks. A brief report of the case is given by Damar Harrison, loc. cit.	Ulnar nerve. Excision of neuromatous tumor.	Primary.	4 inches.	4 in. grafted from the sciatic of a dog.	Sensation is said to have returned at the end of thirty-six hours.
15	Moullin. Lancet, June 24, 1893.	Male, aged 28. Ununited fracture left humerus; good union of bone after operation, but motor and sensory paralysis. Section of musculo-spiral nerve removed.	Secondary.	2 inches.	2 in. of dog's sciatic implanted between resected ends of musculo-spiral, sutured with catgut.	Healed by first intention; sensation began to return in 3 days, and 5 days later was nearly normal in fingers; 15 days later only a very small region at metacarpo-phalangeal joint of index finger remained affected, and this soon disappeared; muscles reacted to strong faradic currents and seemed firmer, but voluntary power did not return, and wasting became extreme.
16	Heath. Lancet, 1893, vol. i. p. 1194.	Servant, aged 21. Right ulnar nerve. Gap of 2 inches left from excision of tumor; operation January 6, 1893; motor paralysis; anæsthesia of little and inner side of ring finger and back of hand to 3d metacarpal.	Secondary, 4 days after injury.	2½ inches.	Ends of excised nerves freshened and piece of posterior tibial of an amputated limb transplanted; five silk sutures used	Decrease of anæsthesia of back of hand on 4th day. It had extended only to 3d metacarpal and now extended to 4th; no further return of sensation or power to muscles innervated by ulnar. Anæsthesia on palmar surface still existed to 4th metacarpal Operation Jan. 6, 1893; March 27 no return of function of ulnar; little finger blue and glossy, and small ulcer on dorsum.
17	Bradley. Medical News, Feb. 8, 1896; Lancet, 1896, vol. i. p. 1592.	Soldier. Musculo-spiral from fracture of right humerus. Paralysis of extensors; operat. June 22, 1895; nerve continuous, but involved at seat of injury in hard nodular tumor 2 ctm. long, 1 thick, nerve on each side for some distance firmly adherent to callus and dissected away with difficulty; tumor removed.	Secondary, 2 months after injury.	5 ctm.	5 ctm. of prepared sciatic of dog inserted in gap left by removal of tumor; catgut sutures.	About one month after operation case passed from observation; thought there was some return in sensibility when last seen; no improvement 5 months after operation. Patient now in Soldiers' Home, Washington, D.C. The attending surgeon writes, under date of April 2, 1898: "Respectfully returned to the Gov. of the Home, with the report that —— has paralysis of the right hand and fingers. The nerve-grafting experiment was entirely unsuccessful."
18	J. William White. Unpublished data received from Dr. White in communication dated April 8, 1898. He was consulting surgeon, and did not have written notes of case.	Female. Musculo-spiral nerve had been divided some time previously in removal of small tumor; operation showed ends considerably separated; nerve flap operation performed and ends united; no improvement followed. After another considerable delay second operat'n, uniting portions of nerve converted into a thin band of fibrous tissue; sections made and healthy nerve exposed above and below.	Secondary, considerable time after injury.	…………	Sciatic nerve of dog inserted in gap between resected ends of musculo-spiral; latter and dog nerve were thr'gh a small decalcified chicken bone intended to give stability to both.	Immediate result encouraging; no permanent improvement resulted.

No.	Operator and where reported.	Nerve operated upon and nature of injury.	Primary or secondary operation.	Distance separating central and peripheral segments.	Method used to overcome the nerve defect.	Results.
19	A. H. Ferguson. Unpublished.	Female, aged 18. During removal of neuroma of left median one inch of latter nerve removed just above wrist; gap bridged with catgut; in six weeks there was anæsthesia over area supplied by median. Grasp of hand imperfect. Three months after operation, Aug. 12, 1893, there was noticeable atrophy of the ball of the thumb; grasp about same; return of sensation not marked.	Secondary, Aug. 12, 1893, 3 months after catgut strands operation.	1⅓ inches.	1⅓ in. of sciatic nerve of young dog inserted between separated fragments of median; silk sutures used.	Improvement in sensation; third day after operation could locate fingers by pin pricks except third finger. On eighth day thumb and adjacent three fingers sensitive; ring finger hyperæsthetic; sensation around the nails was present Six weeks after the operation complained of painful, creeping sensation down fingers; sensation more normal; no return of motion. Was under direct observation for one year; improvement in motion began three months after operation; during year muscular power varied markedly during short intervals. Two years after operation (1895), "hand still lame, but very useful; sensation entirely returned for objects larger than fine thread or horse-hair."
20	Peterson.	Male, aged 24. May 17, 1896, sustained circular saw-cut of right wrist; median and ulnar nerves severed, also a number of flexor tendons; these were sutured; complete loss of sensation over areas supplied by median and ulnar nerves; blebs and ulcers appeared on fingers; fingers became flexed from contraction of tendons; marked atrophy of small muscles of hand and the thenar and hypothenar eminences flattened; hand could be partially closed; adduction and apposition of thumb impossible. Electrical examination showed reaction of degeneration in small muscles of hand. Operation Oct. 24, 1896, over five months after injury.	Secondary, 5 months after injury.	3½ ctm.	4 ctm. of sciatic nerves of a dog inserted between the incised ends of both median and ulnar nerves; fragments sutured with kangaroo tendon above and below.	Return of sensation to thumb 24 hours after operation. 7th day after operation. Superficial suppuration of median incision; sensory area on thumb increasing; pricking sensation of hand. 8th day, rapid increase of sensation over dorsal surface of hand. From 8th to 21st day, increasing sensory areas on dorsal and palmar surface of hand; trophic ulcers have disappeared; hand natural color. On 21st day decided improvement in muscular power; can touch dorsal surface of second knuckle of first finger with end of thumb, etc. Two months after operation tips of fingers can be closed into palms; grasp of hand good; less atrophy of small muscles of hand. 3 months. Went to work; said his hand was as good as ever; could chop wood, etc.; sensation complete except tips of 2d, 3d, and 4th fingers. 4 months. Froze his hand, unable to use it for eight months; discharge from 1st and 3d fingers necessitating amputation. 1½ years after operation. Hand used every day in his work; sensation very nearly normal; finer movement of hand still impossible; some atrophy of muscles.

SUMMARY OF TWENTY CASES OF NERVE TRANSPLANTATION.

Of the 20 cases, 9 were males and 5 females. The sex was unrecorded in 6. The age was stated in 12 cases, the average being twenty-seven and one-half years. The median nerve alone was operated upon in 7 cases, the ulnar alone in 3 cases, and the median and ulnar together in 2 cases. The musculo-spiral was operated upon in 7 cases, and the sciatic in 1 case.

The injuries to the nerves necessitating transplantation in 10 cases were due to removal of tumors involving the nerves. Incised wounds were responsible for 4 cases. Injury followed operation for necrosis twice, while gunshot-wound, operation for gluteal abscess, ununited fracture, and simple fracture were responsible for one case each.

There were 8 primary and 12 secondary operations. The time elapsing from date of injury to time of operation varied from forty-eight hours to one and one-quarter years. Eight out of the 12 cases of secondary operation, or two-thirds, showed improvement in sensation or motion, while only 4 out of the 8 cases of primary operation, or one-half, showed signs of improvement. However, 2 of the 8 cases (11 and 12) were observed only ten and six days respectively.

The distance separating the central and peripheral fragments varied from 3 to 10 cm. As far as can be judged, the distance did not seem to effect ultimate results. In 9 cases the transplanted segments were from sciatics of dogs, in 5 from recently amputated limbs, in 3 from the sciatics of rabbits, and 1 each from the spinal cord of a rabbit and the sciatic of a kitten. In one case the excised nerve was itself implanted.

In 9 cases catgut was used to unite transplanted segments to central and peripheral ends of excised nerves, in 3 silk, and once kangaroo tendon was employed. In 7 cases no mention is made of the suture material.

Strictly speaking, no case can be said to have recovered entirely, if by that be meant a complete restoration of sensation, together with a return of the muscles to their former size and power. The nearest approach to this condition occurs in the case longest under observation (10), where at the end of six years sensation had entirely returned, and the only remaining weak muscle was the abductor of the thumb. In 3 cases (10, 19, and 20) there was practical recovery of sensation and motion, so that the hand was entirely useful. In two of these (10 and 20) both median and ulnar nerves were operated upon.

There was complete return of sensation recorded in 4 cases (7, 10, 11, and 19). In 3 cases (12, 15, and 20) there was nearly complete return of sensation. Improvement in sensation was recorded in 4 cases

(5, 13, 14, and 16), while improvement in muscular power is noted also in 4 cases (7, 8, 12, and 13).

There was improvement in either muscular power or sensation in 12 cases (5, 7, 8, 10, 11, 12, 13, 14, 15, 16, 19, and 20), while in 6 cases (1, 4, 6, 9, 17, and 18) there was no improvement in either sensation or motion.

The shortest time any case was under observation was six days; the longest six years. Of the 5 cases under observation one year or more (4, 10, 17, 19, and 20), 3 (10, 19, and 20) made nearly complete recoveries in both sensation and motion.

The average time in which sensation first appeared after the operation was about 10 days, while the average time for the first appearance of motion was about 2½ months.

GENERAL CONCLUSIONS.

1. Transplantation of a peripheral nerve segment to bridge over a gap between the two ends of a resected nerve is a legitimate surgical procedure.
2. Under favorable conditions at least partial and at times complete restoration of sensation and motion may be expected to follow the operation.
3. Regeneration of the degenerated peripheral end is due to downgrowths from the axis-cylinders of the central end.
4. From the slowness of this process the longer the time after operation the more favorable will be the results.
5. Sensation may return very early after operation, and, as a rule, precedes return of motion.
6. This rapid return of sensation is not due to down-growth of axis-cylinders or to conductivity of the transplanted fragment, but must be explained by collateral nerve-supply.
7. In many cases very early return of motion after transplantation may be due to vicarious movements of other muscles than those formerly paralyzed and not to a regeneration of the latter's nerve-supply.

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ABSCESSES OF THE CEREBELLUM FROM INFECTION THROUGH THE LABYRINTH:

THEIR DIAGNOSIS AND TREATMENT, INCLUDING A STUDY OF FOUR CASES.

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Case I. *Chronic suppuration of the tympanum; caries into labyrinth; abscess of cerebellum from infection through the meatus internus.*—R. C. S., aged twenty-six years, a robust negro, with chronic suppuration of the right tympanum for twenty years, following measles, was first seen November 29, 1895, in an unconscious condition. Four weeks before he suddenly had vertigo, followed by vomiting and pain in the ear and head, but not enough to keep him in the house. Ten days before a small polypus was removed from the ear; ever since there had been much dizziness, vomiting, and severe pain at the vertex of the head. For the last twenty-four hours he had been delirious. On examination he was totally unconscious, but very restless; there was divergent strabismus; the fundus of the right eye was normal, that of the left eye could not be seen (Dr. A. G. Morse). The meatus was filled with a very profuse, thin, bloody discharge; the right drum membrane had been entirely destroyed, and desquamative material was protruding from the aditus; there was apparently no tenderness of the mastoid. Pulse 72 and strong. Temperature 99° F. by rectum.

After consultation with Dr. James J. Putnam, exploration was decided upon as a last resort, and a tympano-mastoid exenteration was done. The bone was sclerosed throughout, the antrum, aditus, and epitympanum were filled with desquamative material and granulations, and much caries could be felt on the inner wall of the tympanum. During the chiselling of the mastoid, when not near the Fallopian canal, the face was noticed to twitch repeatedly. The upper and inner walls of the mastoid and tympanum were very firm and nowhere carious. The sigmoid groove was opened and the lateral sinus aspirated, but only venous blood obtained.

The patient gradually sank, and died at 1 P.M. the next day, without new symptoms of any kind, the temperature never going above 100° F.

Autopsy. Cerebellum adherent to the whole posterior surface of the petrous bone. An abscess, one and three-quarter inches by three-quarters of an inch, at the base of the cerebellum, opening against the posterior surface of the petrous bone. Very abundant fluid in the ventricles, and the convolutions of the cerebellum somewhat flattened, probably from this fluid. Cultures from the abscess showed pneumococci, streptococci, and numerous other organisms.

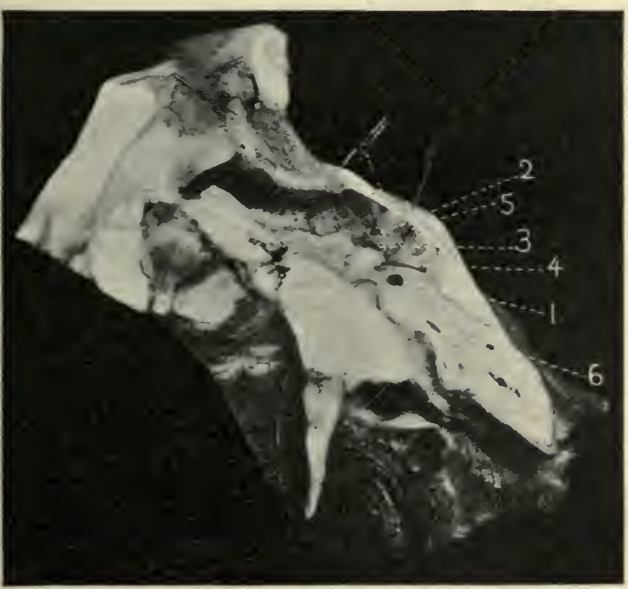
In the lateral sinus at the seat of exploration was a small, adherent thrombus, the size of half a pea; cultures from it were sterile. Other organs healthy.

Petrous bone. There was a small mass of cerebellar substance adherent to the dura (half an inch by a quarter of an inch), between the internal meatus and the aquæductus vestibuli, but no ulceration of the dura. The internal meatus was filled with pus, and the auditory and facial nerves discolored and fused together. The entire horizontal portion of the

Fallopian canal was destroyed by caries, and the facial nerve ran directly through the tympanum; above this was a carious opening into the vestibule and superior semicircular canal, three-eighths of an inch long and one-eighth of an inch wide, and another carious opening, one-eighth of an inch wide, into the external semicircular canal, and still another carious opening, one-eighth of an inch long, into the carotid canal.

Anatomical diagnosis. Abscess of the cerebellum in direct connection with the internal meatus; carious perforation from the tympanum to the vestibule, and a mixed infection of the brain from the vestibule along the meatus internus.

FIG. 1.



1. Foramen ovale. 2. Caries into vestibule. 3. Caries into external semicircular canal. 4. Caries of Fallopian canal with a wire where the nerve was exposed. 5. Caries into superior semicircular canal. 6. Caries into carotid canal.

CASE II. *Chronic suppuration of the tympanum; caries into labyrinth; arachnitis of cerebellum and cerebrum; abscess of cerebellum from infection through the aquæductus vestibuli.*—A. C., aged thirty-two years, a robust man, had had a chronic suppuration of the right ear for years without treatment, and entered the infirmary on January 10, 1898. Three weeks before entrance he began to have pain in the ear, but not severe enough to prevent him from work. On December 30th, while at work, he suddenly had severe vertigo, with vomiting, obliging him to go to bed. The vomiting continued for three days, then ceased, and did not recur. The vertigo continued and kept him in bed. Four days before entrance the pain in the ear and vertigo became much more intense, with pain throughout the frontal region. On January 8th he had a chill.

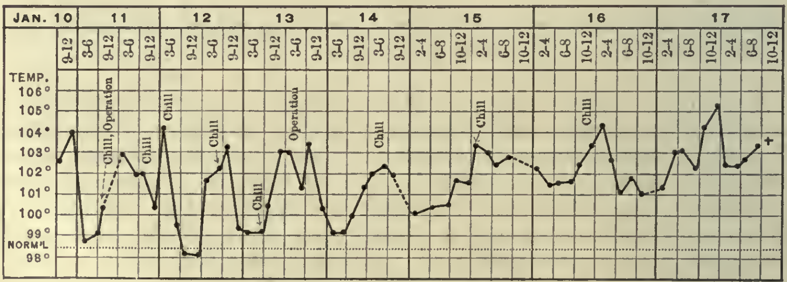
On entrance he was weak, complaining constantly of severe pain in the frontal region and vertigo on moving; intellect clear; pupils reacting and equal; reflexes of knees normal; no optic neuritis and no paralysis. Right meatus filled wth a polypoid growth, which was immediately removed with a snare. No sensitiveness of the bone on pressure. Lungs healthy. Temperature 102.8° F. and pulse 105. Ice-bag to the head and morphine. Skull index of breadth 77 (mesocephalic).

January 11*th*. A blood-count gave 20,100 white corpuscles. Under ether a full tympano-mastoid exenteration was performed. The mastoid was sclerosed and very hard; the antrum filled with desquamative material and with carious walls; the anterior superior quadrant of the drum membrane destroyed; the malleus had lost its entire head by caries; the incus was not found, having probably been destroyed by caries; the stapes was in position, but its head and one crus were carious; it was not removed. No carious fistula to the brain could be discovered nor any caries of the upper or inner walls. After the operation there were slight chills at 11 A.M. and 7 P.M.

12*th*. Two slight chills and a slight delirium, but he took nourishment well.

13*th*. A severe chill, lasting twenty minutes, at 6 A.M. Headache rather less, and says he feels "fairly comfortable." On deep pressure some tenderness was found in the upper posterior part of the neck on the right side. On consultation with Dr. S. J. Mixter it was decided to explore the brain, and under ether the lateral sinus was exposed from the middle to the lower part of its descending portion by removing the inner cortex of the mastoid. The sinus walls and dura were perfectly healthy; no cording of the vein; an aspirating needle was passed into the sinus, but only venous blood obtained; subsequent cultures from this blood were negative. Exploration with a probe was made for one and one-half inches along the posterior surface of the petrous bone outside of the dura, with the expectation of finding pus about the meatus internus or aquæductus vestibuli, but only clear fluid was obtained. Subsequent cultures from this fluid, however, showed streptococci and diplococci pneumoniæ. During recovery from the ether there was a slight chill.

FIG. 2.



Temperature chart of Case II.

14*th*. Delirious at times.

15*th*. Slept all night. Chill at 2 P.M., with a temperature of 106° F.

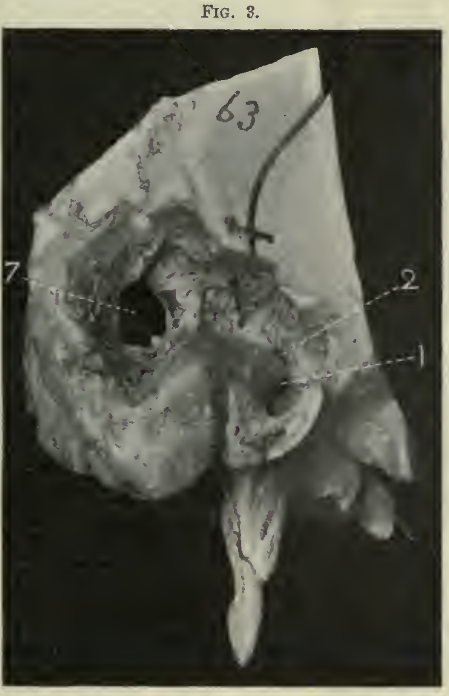
16*th*. Slept quietly all night. Took nourishment well. Intellect dull; headache at vertex; chill at 12 M. Blood count at 7.30 P.M., 20,000 white corpuscles.

17*th*. Stupor, subsultus, very free perspiration all the time; suspicion of flatness of right side of face and external strabismus of the left eye. Died quietly at 12.45 P.M.

Autopsy. Cerebrum. Cerebro-spinal fluid opaque, and culture showed bacillus pyocyaneus and streptococci. Slight opacity of vessels of pia, and cultures gave bacillus pyocyaneus. Dura smooth, not adherent.

Cerebellum. Slight purulent deposit on its upper surface and a more abundant deposit on its base on both sides. On the right side, on its inferior surface, the pia was inflamed over an area three-fourths of an inch in diameter, corresponding in situation to the aquæductus vestibuli. Within this was a fistulous tract half an inch long, leading into an abscess about one inch in diameter, situated in the extreme anterior part of the right digastric lobe. A culture from this abscess gave bacillus pyocyaneus and streptococci.

FIG. 3.

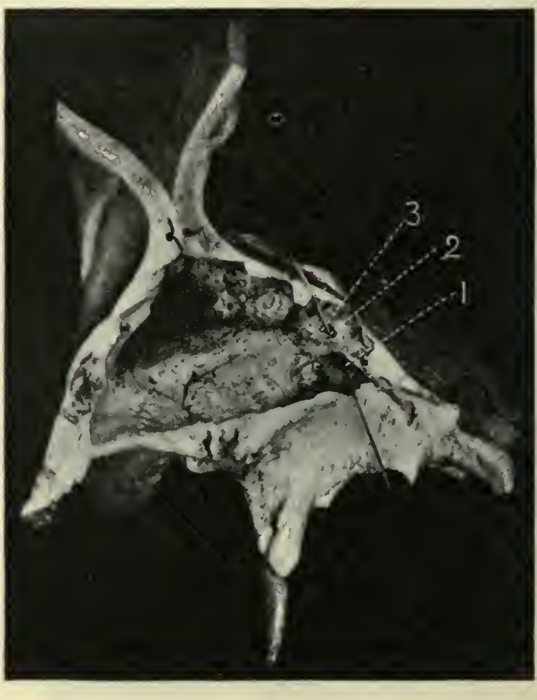


1. Foramen ovale. 2. Caries into vestibule. 7. Opening into sigmoid groove.

Petrous bone. The dura was healthy except at the aquæductus vestibuli, where there was in the bone a collection of pus as large as a bean. The auditory nerve within the internal meatus was swollen and discolored, the facial nerve was not affected macroscopically. Within the lateral sinus, at the seat of aspiration, was a minute adherent thrombus, firm, and apparently not infected. The rest of the sinus was healthy and the walls perfectly smooth and glistening. After maceration the bone showed caries of the medial and lower wall of the aditus and of the lower posterior edge of the promontory, and also a carious perforation of the external semicircular canal into its ampulla, one-eighth of an inch long and one-sixteenth of an inch wide.

Anatomical diagnosis. Arachnitis of cerebrum and cerebellum. Abscess of the right digastric lobe of the cerebellum, communicating by a fistulous tract with a collection of pus at the orifice of the aquæductus vestibuli. Carious perforation from the tympanum to the external semicircular canal, and infection through this to the vestibule and thence along the aquæductus vestibuli to the brain.

FIG. 4



1. Foramen ovale. 2. Caries into vestibule. 3. Caries into external semicircular canal.

CASE III. *Chronic suppuration of the tympanum; caries into labyrinth; encephalitis of cerebellum, with abscess from infection through the whole labyrinth.*—T. P., aged eighteen years, previously healthy; entered the infirmary on January 29, 1898. A chronic suppuration of the left tympanum had existed for one and a half years. Ten days before, without known cause, he had sudden vertigo, followed by much pain in the ear and frontal headache, great increase in the deafness, but no vomiting or fever. He was obliged to remain in bed. Four days before entrance facial paralysis showed itself. Examination showed the left drum membrane red, much infiltrated, and with a perforation in the middle of its posterior segment, through which a probe detected bare bone. All branches of the left facial were completely paralyzed, but the tongue and palate were not affected.

The hearing tests were:

W. r. 60/60″ : 1. 0/60″ : V. r. 20/25′ : 1. 1/(45′)?

F. 512 v. s. $\frac{AC}{BC}=\frac{20''}{10''}$ r. 20/8″ : 1. 0/6.″ F. 512 v. s. r. $>$ 1.

Tone limits: High r. n. : l. n. Low r. 40 v. s. : 1. 1024 v. s.

The blood showed 14,000 white corpuscles. Skull index of breadth 78.2 (mesocephalic). Temperature 99° F. Pulse 60.

January 30*th*. A full tympano-mastoid exenteration was performed, the bone being sclerosed. The sinus was exposed within a quarter of an inch of the meatus and the antrum was opened from the meatus backward. The malleus, incus, and membrana tympani were removed. The long process of the incus had been destroyed by caries. The facial nerve was seen crossing the tympanum, the Fallopian canal having been destroyed by caries. The inner wall of the tympanum was carious, but the roof of the tympanum and mastoid and the inner cortex of the mastoid were healthy.

31*st* and *February* 1*st*. Slight tendency to delirium, sopor from which he could be aroused with difficulty. A blood-count gave 13,300 whites. Much pain over left side of head.

2*d*. Examination by Dr. James J. Putnam showed "papillitis of both eyes, most marked in the left; knee-jerks absent in right, slight in the left; plantar reflexes less on the right than on the left; cremasteric reflexes equal in the two sides. Eyes deviate to the right, and the right one more than the left; pupils vary in size, independently of the light." Temperature 99° F.

Under ether the opening in the inner mastoid wall was enlarged by gouges and rongeurs forward, exposing the cerebellum in front of the lateral sinus. The dura and sinus were healthy, the latter unusually large. Exploration outside of the dura along the petrous bone was negative. After thorough cleansing with sterile salt solution the dura was incised by a short, straight incision, evacuating two or three drops of clear cerebro-spinal fluid, subsequent cultures from which, however, gave staphylococcus. Immediately following this was a drop of thick, opaque matter, which, on cultures afterward, showed staphylococcus. A director was then passed into the cerebellum, parallel with and one-quarter of an inch behind the posterior surface of the petrous bone, for an inch and three-quarters, but nothing was obtained. Still feeling confident that there was an abscess connecting with the passages of the labyrinth, a pair of narrow forceps, closed, was passed into the opening, spread and then withdrawn, but no pus was evacuated, although a little disorganized brain tissue exuded, from which cultures afterward showed staphylococcus. Another exploration was made backward with a director to the depth of one and a third inches, but nothing found.

3*d*. He was more rational and better in every way apparently. The dressings of ear and mastoid were changed, but those of the brain not touched.

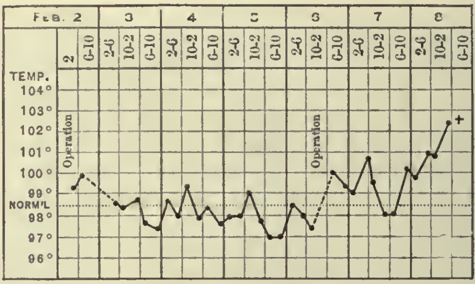
4*th*. Dr. Putnam reported the optic neuritis increasing in both eyes.

5*th*. The sopor returned, he took little nourishment, and the whole scalp of the occiput became enormously œdematous and so continued.

6*th*. After consultation with Dr. S. J. Mixter the cerebrum was exposed just above the meatus and the roof of the tympanum examined, but found healthy. The dura was normal and was not opened. The cerebellum was exposed behind the lateral sinus and again explored in three directions to the depth of an inch and a quarter, with negative result.

7th. The sopor passed into coma, and he died on the 7th, the temperature rising in the last six hours. to 102.5° F., having previously been but little above the normal.

FIG. 5.



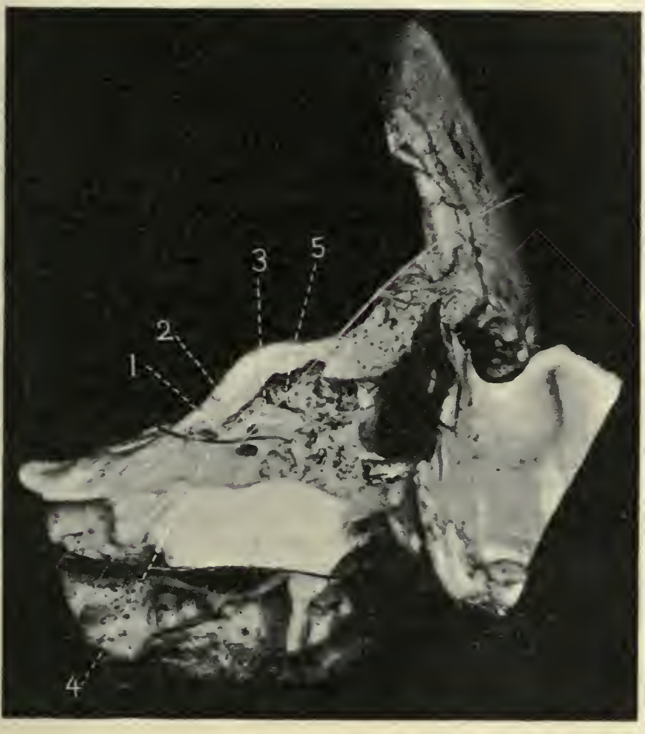
Temperature chart of Case III.

Autopsy. Great œdema of the scalp just above the superior curved line of the occiput. Cerebrum normal. Cerebellum adherent to the dura for one-quarter of an inch over aquæductus vestibuli and also at the seat of exploration. In the anterior part of the left digastric lobe of the cerebellum, and separated from the point of the first exploration by one-quarter of an inch of healthy brain tissue, was an abscess one and a half inches long, three-quarters of an inch wide, and one-half an inch thick, filled with thick, creamy pus, encapsuled by a thin (pyogenic) membrane. There was a zone of dotted and striated bright red tissue parallel with and a quarter of an inch inward from the posterior edge of the cerebellum on both sides, and the whole cerebellum was softer than normal (encephalitis). No fistula communicating with the bone was found, and there were absolutely no signs of the exploratory punctures. The surface of the cerebellum at the seat of operation was slightly discolored and softened.

Petrous bone. A bit of cerebellum, apparently healthy, was adherent at the aquæductus vestibuli, and another bit of brain substance adherent at the internal meatus. The auditory nerve was swollen and discolored at the cribriform plate, but the facial nerve was macroscopically healthy there. The facial nerve in its horizontal portion in the tympanum was freely exposed. There was extensive caries of the entire osseous labyrinth, viz., caries above the fenestra ovalis into the vestibule, destruction of the entire horizontal portion of the Fallopian canal, carious opening into the external semicircular canal, caries into the superior semicircular canal, caries of the inner and upper walls of the antrum extending to the upper and posterior surfaces of the petrous bone, caries of the Fallopian canal from the internal meatus to the geniculate ganglion, and superficial caries of the posterior surface of the petrous bone and of the internal meatus.

Anatomical diagnosis. General encephalitis of the whole cerebellum with abscess of the left digastric lobe. Caries of the entire osseous labyrinth.

FIG. 6.



1. Foramen ovale. 2. Caries into vestibule. 3. Caries into external semicircular canal. 4. Caries of Fallopian canal with a wire where the nerve was exposed. 5. Caries into superior semicircular canal with a bristle passing through and out at the caries of the vestibule.

CASE IV. *Chronic suppuration of the tympanum; caries into labyrinth; no brain disease.*—T. B. H., aged thirty-one years, not robust, with a chronic suppuration of the left tympanum since childhood, entered the infirmary on January 5, 1897. Six years before a polypus was removed from the ear, and afterward the discharge diminished, but never ceased, although the ear was free from pain. On January 1st, while at work, he suddenly felt so dizzy that only by holding to his bench could he keep from falling. He was unable to see, and "everything seemed to be going upward." There was no nausea. The next day shooting pain began in the ear and on the left side of the head, and the dizziness came on whenever he tried to sit up. On January 4th he had a slight chill.

On entrance examination showed a marked general hypertrophy of the left mastoid and sensitiveness on pressure in its posterior and superior portions. The drum membrane was largely destroyed, but no tympanic caries could be felt. No optic neuritis (Dr. Quackenbos). Pain over the left side of the head and vertigo on sitting up, but no nausea. Face pale and anxious.

Tests:

W. r. 30/100″ : 1. 1/100″ : V. r. 5/25′ : 1. 1/35′. F. 512 v. s. r. < 1.

F. 512 v. s. $\frac{AC}{BC}=\frac{20''}{10''}$, r. 24/14″ : 1. 4/14″.

Limits: High r. n. : l. n. Low r. 26 v. s. : l. 256 v. s.

Reflexes normal. Skull mesocephalic. Temperature 98.4° F. Pulse 72.

January 6th. During the night chilly, and pulse fell to 44 and temperature to 97° F., but after application of artificial heat became normal by morning.

7th. No leucocytosis by blood-count. Slept well till 5 A.M., when he awoke "feeling weak and as if his body was going to pass through his head." No pain. Pulse 48, and strong.

8th. Again awakened by "weakness."

10th. Anorexia and nausea. A decidedly tender point three inches posterior to auricle and one-quarter inch below superior curved line of the occiput.

After consultation with Dr. Putnam, a full tympano-mastoid exenteration was done under ether. Bone densely sclerosed, the aditus and antrum full of desquamative material. On the posterior part of the inner wall of the aditus was a carious opening, slit-like and one-eighth of an inch long, into which a probe could be passed for one-eighth of an inch (the external semicircular canal). The edges of this were curetted. All the rest of the antrum, aditus, and tynpanum were of ivory-like bone without caries.

13th. Pain in the stomach and constant nausea. No pain in head or dizziness. Nystagmus in both eyes on looking to the right, but never on looking to the left. Nutritive enemata ordered. Temperature 99° F.

14th. No nausea or pain.

15th. Much better; nystagmus less; some dizziness; subjective noises in the ear. Convalescence was uninterrupted from this time.

23d. The nystagmus and vertigo had entirely disappeared, and he went out for the first time. The exposed bone gradually covered with granulations, became covered with epidermis, and on January 30th was covered by a firm, dry epidermis, leaving an opening behind the ear one-half by three-sixteenths of an inch, and from the antrum a membrane had formed about half-way across the tympanum.

The hearing tests were:

W. l. 0/100″ : V. l. 1/40′ (?) F. 512 v. s. $\frac{AC}{BC}=\frac{20''}{10''}$: l. 0/7″.

Tone limits: High l. n. Low l. 2048 v. s.

Analysis of the Symptoms.

R. C. S.	A. C.	T. P.	T. B. H.
O. M. S. chr. r. 20 yrs.	O. M. S. chr. r. years.	O. M. S. chr. l. 1½ years	O. M. S. chr. l. 25 years.
Sudden vertigo.	Sudden vertigo.	Sudden vertigo.	Sudden vertigo.
Pain in ear.	Pain in ear.	Pain in ear.	Pain in ear.
Headache, vertex, bilateral.	Headache, frontal, bilateral.	Headache, frontal, bilateral.	Headache, unilateral, left.
Divergent strabismus, both.	External strabismus, l.	....	Nystagmus on looking to r.
No optic neuritis.	No optic neuritis.	Optic neuritis, most in l.	No optic neuritis.
....	Knee-jerks present.	Knee-jerks absent in r.	Knee-jerks present.
....	....	Facial paralysis from ear.	
....	Nausea.	No nausea.	Nausea.
No chills or fever.	Chills and fever.	No chills or fever.	No chills or fever.
....	Leucocytosis 20,100.	Leucocytosis 14,000.	No leucocytosis.
Delirium at end.	Delirium at end.	Delirium at end.	No delirium.
Sclerosis of the bone.	Sclerosis.	Sclerosis.	Sclerosis.
Caries into labyrinth.	Caries into labyrinth.	Caries into labyrinth.	Caries into labyrinth.
....	Arachnitis of cerebrum and cerebellum.	Encephalitis of cerebellum.	No brain disease.
Abscess of cerebellum 1¾" x ¼".	Abscess of cerebellum.	Abscess of cerebellum 1¾" x ½" x ¼"	
Infection from meatus internus.	Infection from aq. vestibuli.	Infection from whole labyrinth.	

The above analysis of the symptoms in the four cases affords some interesting comparisons. In all a chronic tympanic suppuration was running its course, without other symptoms than otorrhœa, when there was a sudden attack of vertigo, followed soon by dull pain in the depth of the ear. In one (T. P.) this was noticed to be accompanied by a marked increase in the deafness. At this time the penetration and infection of the labyrinth undoubtedly occurred, the vertigo being due to irritation of the cristæ acusticæ of the ampullæ of the semicircular canals. In all four headache was a prominent symptom. In the three cerebellar abscesses it was bilateral; in two of these frontal, and in the other at the vertex. In none of them was there any complaint of the occipital region. In the fourth case, of simple caries without brain disease, the headache was unilateral on the side of the affected ear, as is not uncommon with tympanic suppurations alone. Paralysis of the abducens (sixth) occurred in two, in one bilateral, in one unilateral, on the opposite side from the ear disease; it was perhaps due to pressure on the base of the cerebellum, perhaps to a central lesion; its cause could not be proved directly at the autopsy. Optic neuritis was present in only one case, that of extensive encephalitis with abscess of the cerebellum. It was absent in all the others. In my experience with otitic brain disease its absence has no meaning whatever. Its presence with other symptoms is confirmatory of brain disease, but is of little value in defining or localizing the lesion. The facial paralysis of T. P. I regard as sufficiently explained by the condition of the tympanum. It was due to pressure on the nerve in the Fallopian canal from extension of the inflammation through carious destruction of part of the canal. In only one case were there general septicæmic symptoms (A. C.); in the others fever was absent till nearly the end. Leucocytosis was present in two of the cases of cerebellar abscess, and in the third one no blood-count was made. It is interesting to note the presence of a moderate leucocytosis in T. P., although infection of the general system was absent, there being no chills or fever. Nystagmus on looking away from the diseased ear was well marked only in T. B. H. (simple caries). The presence of this symptom with disease of the labyrinth, although not always present, has been noted by German observers. It should not be regarded as a brain symptom, and was seen only in this one case of simple labyrinthine inflammation.

Sclerosis of the bone existed in all the cases—a condition always likely to be found in any case of long-continued tympanic suppuration, even when there have been no symptoms pointing to the mastoid. The situation of the caries was practically the same in all of these cases, viz., on the inner (labyrinthine) wall of the aditus and epitympanum. In all four the external semicircular canal had been perforated where it comes against the aditus wall. In the three cases in which accurate dissection was possible the wall of the vestibule just above the Fallopian canal had been destroyed, and in two of them the entire tympanic horizontal portion of that canal had also been destroyed.

The cerebellar abscesses were of about equal size and situated in the anterior and lower portions of the cerebellum on the same side as the ear disease, one of them opening directly against the meatus internus, the other two separated from the bone by respectively one-quarter and one-half inch of brain substance. In one of these two a distinct fistula connected the abscess with the labyrinth. In the other, although no fistula was found, the cerebellum was adherent to the dura over the aquæductus vestibuli. The arachnitis of A. C. was of only moderate intensity in the cerebellum and slight in the cerebrum. The connection between the two portions of the brain could not be discovered, and I regard it as a development of only the last day or two of life, and not the cause of the earlier symptoms. The intensity of the redness and the absence of extensive softening in the general encephalitis of T. P. made me think that this also was of very recent origin.

In all of the cases an accurate diagnosis before operation was absolutely impossible. In R. C. S. and T. P. abscess of the brain was the probable diagnosis, but whether cerebral or cerebellar could not be determined. In A. C. the repeated chills, high fever, and marked leucocytosis led me to make a probable diagnosis of phlebitis of the sinus, but in all of the cases the diagnosis was tentative, dependent on what was found on opening the ear cavities. They all show the value of the tympano-mastoid exenteration in exposing the whole interior of the bone, and thus showing the course which the inflammation has taken in reaching the brain, aud thus determining at least the situation of the brain-disease, if not its character. The finding of the caries into the labyrinth, the absence of caries in all other parts (the roof or internal mastoid wall), the exposure and exclusion of disease of the sinus by aspiration pointed to the labyrinth as the direct route of infection. In every case this proved to be correct.

Otitic abscesses of the cerebellum are due to extension of the inflammation either through the inner wall of the mastoid or through the labyrinthine passages. In the former the abscess is in the posterior portion of the cerebellum; in the latter in the anterior portion. The posterior abscesses can be reached by removing the inner wall of the mastoid, and then, by rongeurs or gouge and mallet, carrying the opening backward to any desired extent, thus exposing the cerebellum below and behind the lateral (sigmoid) sinus, thus giving most thorough and efficient drainage.

The anterior abscesses, like those in this paper, offer much greater difficulties. They lie so far forward that to reach them from an opening behind the sinus involves puncturing the brain for from an inch to an inch and a half, and drainage for this distance nearly on a level must be inefficient. To reach them from an opening in the occipital bone below the superior curved line requires a greater length of puncture and gives even less favorable conditions for drainage. From a point just in front of the sinus, however, the distance to the orifice of the aquæductus vestibuli is only about one-fourth of an inch, and to the meatus internus about three-fourths of an inch. The posterior surface of the petrous bone can be removed for some distance forward and inward from this point, however, thus reducing these distances one-half. This was the method adopted in the cases of A. C. and T. P. for exposing the cerebellum, and in similar cases of anterior abscesses I should use it again. It has the advantage of allowing the surgeon to explore outside of the dura along the posterior surface of the petrous bone, which cannot be done in most cases from an opening behind the sinus on account of the great projection of the vein. It has the disadvantage that the opening can never be very large, about half an inch in diameter being its greatest size. The removal of the posterior surface of the petrous, where the bone is very thick, solid, and lying deep, is much facilitated by the use of gouges slightly curved on their hollowed sides for half an inch at the ends.

Whether these anterior cerebellar abscesses will prove to be as amenable to treatment as the posterior ones experience has yet to show. The cases cited show the difficulties of reaching the lesion, even after it has been located, for in all three the preliminary exenteration showed that the labyrinth was the path of infection.

In R. C. S. the serious condition of the patient seemed to forbid further operation. In A. C., before opening the dura I pushed it inward with a director and explored along the posterior surface of the petrous bone for an inch and a half, fully expecting to find pus near the meatus internus, assuming, wrongly as it turned out, that with extension from the labyrinth I should get indications of it outside of the dura, and failing to get these I desisted from explorations of the cerebellum, which might have revealed the abscess lying within half an inch of the seat of operation. I also made the mistake of not removing enough of the posterior surface of the petrous to get a good view of the dura near the aqueduct. This case also taught me that with the most careful exploration it is easy to miss a small, extradural collection of pus, for, as the autopsy showed, there was a collection at the aqueduct as large as a bean, but encapsuled, so to speak, by adhesions to the bone, so that my director had slipped by it, both above and below, without opening it. In the third case, of T. P., utilizing my experience in the last case, and exploration along the posterior surface of the petrous being negative, I opened the dura, and, obtaining a drop of opaque fluid (subsequently proved to be infective), explored the cerebellum with an ordinary director, choosing this because it is well known that the contents of the brain abscesses are often very dense. Obtaining nothing, a pair of forceps was passed in, opened, and withdrawn, thus tearing an opening one-quarter of an inch long, but without result. The autopsy showed that both of these instruments must have gone, without any question, directly into and through the seat of the abscess. Four days after a second exploration, directly through the seat of the abscess, was equally without result. It might be said that at the first operation the abscess had not fully developed, but this would not hold for the second operation, which was only twenty-four hours before an abscess one and a quarter by three-quarters by half an inch was found. That merely one-quarter of an inch of brain tissue should offer such obstruction to evacuation by such a large opening was a surprise to me.

[NOTE.—Since this paper was written a series of observations reported to the Boston Society of Medical Sciences, November 18, 1898, show that leucocytosis is present in 79.5 per cent. of uncomplicated tympanic suppurations, and therefore fails to be of diagnostic value.]

FURTHER CONSIDERATIONS OF THE MECHANISM OF EAR VERTIGO AND ITS RELIEF BY REMOVAL OF THE INCUS.

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In The American Journal of the Medical Sciences, October, 1896, I published my observations in a number of cases of ear vertigo and recorded my experiences with the surgical removal of the incus for relief of this disease. In this paper I present some original considerations as to the mechanism and paroxysmal nature of chronic ear vertigo, or chronic tympanic vertigo, as I prefer to name it, because the cause of it originates in chronic disease of the tympanic cavity, and append the record of a case of parotitic ear vertigo cured after a year's duration by a removal of the incus. It is the second case of chronic ear vertigo consecutive to mumps I have entirely cured by removal of the incus. The first case was reported in the article in this Journal referred to above.

Unfortunately, all forms of ear vertigo are usually and indiscriminately called "Ménière's disease." The latter is indeed ear vertigo, but ear vertigo is not always "Ménière's disease." Ear vertigo may be due to disease in the external, middle, or the internal ear. The term "Ménière's disease," if it means anything definitely, means internal ear vertigo, due to an apoplectiform lesion of the labyrinth of the internal ear; but there is little or no evidence that such lesions ever occur in the internal ear without previous catarrhal disease in the middle ear, the capillary bloodvessels of which are intimately connected with those of the internal ear. Middle-ear vertigo, or tympanic vertigo, is due primarily to chronic catarrhal disease in the tympanic cavity and the consequently altered condition and mechanism of the ossicles of hearing. External ear vertigo is due to disease in the external ear.

All of these three forms of ear vertigo present very similar symptoms, such as are termed "Ménière's symptoms," viz., more or less deafness and tinnitus, with paroxysmal vertigo, nausea, vomiting, reeling, and often falling, but no loss of consciousness. The last-named symptom is a ready means of differential diagnosis between ear vertigo and epilepsy, alcoholism, and apoplexy, with all of which ear vertigo is sometimes confounded. There are two forms of what may be termed pseudo ear vertigo, viz., vertigo due to a tumor in the tract of the auditory nerve and vertigo due to traumatism of the ear in connection with traumatism of the cranium. In both of these pseudo ear vertigoes the cause does not arise in the ear, but from irritation conveyed to it. In these cases vertigo is more or less constant, and rarely if ever as violent as in the pathognomonic paroxysms of true ear vertigo.

Ear vertigo is due to irritation emanating from some part of the auditory apparatus and conveyed through the ampullæ of the semicircular canals to the motor filaments of the auditory nerve, the peduncles, and the cerebellum; hence the disturbed coördination called ear vertigo. Such irritation may be excited either by undue retraction and impaction of the stapes in the oval window, and consequent compression of the labyrinth fluid and the ampullæ, as in the late stages of chronic catarrhal otitis media. If engorgement of the labyrinth and pressure upon the ampullæ from within the cranium be present, as in parotitic metastasis, such pressure-irritation may be increased at times by sudden retraction and impaction of the chain of ossicles and the foot-plate of the stapes, as occurs in sudden movements of the head, or in an accommodative contraction of the tensor tympani, unnoted by the normal labyrinth, and a paroxysm of ear vertigo takes place. With the labyrinth unduly engorged, as in a case of metastasis, ear vertigo occurs if a sudden increase in the quantity of labyrinth fluid takes place when the stapes is held too firmly in the oval window to yield to this pressure upon its foot-plate from within. This amounts to the same force as sudden impaction of the stapes, since the labyrinth space is compromised by the failure of the stapes to move outward, and ear vertigo results from pressure-irritation in the ampullæ. The latter process is most likely to take place in the late stages of chronic catarrh of the middle ear; but in both instances the process is essentially a mechanical one, viz., a disturbance in the muscular tension and mobility of the auditory apparatus in the middle ear, and we have therefore to deal with a mechanical disease.

The paroxysmal nature of ear vertigo can be explained only by assuming that it is due to temporary increase in retraction and impaction of the stapes in the oval window or temporary engorgement of the labyrinth from within, without compensatory yielding of the stapes, and a consequent pressure on the labyrinth water and the ampullæ. That such is the mechanism of ear vertigo is demonstrated by the curative effect of removal of the incus and liberation of the stapes. Why true ear vertigo occurs paroxysmally cannot be easily explained, but I venture to suggest that it is due to varying degrees of tension in the chain of ossicles or in the labyrinth fluid. The latter, being a part of the lymph system of the subarachnoid space (Hasse), must be subject to varying conditions of tension, as are the ventricles of the brain or the cerebro-spinal fluid. Ordinarily the compensatory yielding of the fenestræ of the labyrinth toward the drum cavity is sufficient to prevent undue pressure in the ampullæ and vertigo. If, however, these yielding points are stiffened as in chronic middle-ear catarrh, in which there is always more or less retraction and impaction of the stapes and thickening of the membrane of the wound window, then either an increased quantity of endolymph or perilymph or both, emanating from the cranial cavity, or a spasmodic or further retraction of the chain of ossicles and impaction of the stapes from tympanic causes, as occur in chronic aural catarrh, is competent to excite a paroxysm of ear vertigo.

If the liability to these paroxysmal impactions of the stapes can be prevented and greater freedom given to the movement of the stapes outward when its foot-plate is pressed upon from within, ear vertigo from the causes mentioned can be prevented. Such immunities can be granted by removal of the incus and consequent liberation of the stapes. In twenty-seven cases of ear vertigo in which I have thus liberated the stapes, entire freedom from incapacitating attacks of ear vertigo has followed the operation. This relief has not always come at once, as long a time as six months having elapsed in some instances before entire relief has been obtained; but in some of the worst cases immediate relief has followed the removal of the incus, as in the case I have reported below. In a few cases the tinnitus has been entirely relieved and in the rest of the cases greatly diminished by the operation. The hearing, uniformily very defective in true ear vertigo, has been uninfluenced by this operation.

The following case of ear vertigo presents much to interest both the general and special practitioner:

Mr. J. W. S., a strong, healthy man, of good habits, conductor on a trolley car, consulted me for the first time on October 14, 1898. He stated that in September, 1897, he had contracted mumps from his little son and had had the disease on both sides. The left parotid gland was attacked first, and then, four days later, the right parotid was attacked. Four days later the left testicle became greatly swollen and intensely painful, and four days later the right testicle was attacked, but less severely. It is stated that no alteration in sexual power has resulted from the orchitis. Two or three days after the orchitis had appeared on the right side the patient had an attack of pleurisy on the right side, which lasted from ten to twelve days, with fever and great pain. The metastatic tendency of this malady is thus sharply demonstrated in this case. On the left side there were pain, tenderness, and swelling about the ear, with shooting pains in the ear, unattended, however, with discharge. Before the parotitis both ears were entirely normal. While still confined to the bed with mumps the patient perceived tinnitus in his left ear and noticed that he was deaf in this ear. As soon as he was able to get up and move about he observed a marked tendency to attacks of vertigo, the tinnitus and deafness continuing. Attacks of vertigo were excited by rapidly moving objects, by his own sudden and voluntary movements of his body or eyes, and also by the rapid motion of the trolley car when he resumed his duties as conductor. The apparent motion of objects has always been toward his left side, and he has felt a tendency at times to reel and fall toward his left. Preceding any vertiginous attack there has been an increase of tinnitus in his left ear, and usually a coppery taste in his mouth, perhaps most marked on the left side of his tongue. This latter gustatory prodrome of an attack of ear vertigo I have never noted before. An increase of tinnitus before an attack of tympanic vertigo is pathognomonic.

After an absence from work for six weeks he resumed his duties as car conductor, but could work only off and on between November 15, 1897, and May 8, 1898, being interrupted by frequent attacks of vertigo, nausea, and vomiting. The longest period of freedom from ear vertigo was two weeks. Three or four times in the above-named period of six months his attacks were so bad while conducting his car that he had to close his gates, lie down in the car, and return to the car-house.

From May 8th to October 14, 1898, the attacks of ear vertigo diminished in frequency but increased in intensity. He felt great timidity in going about alone, and stopped work entirely. Such agorophobia is quite common in chronic ear vertigo.

During all this period of about a year he consulted a number of physicians, some of whom recognized the nature of his malady as an aural one, while others apparently did not. Neither their local nor general treatment gave the patient relief. In October, 1898, Dr. A. G. Miller recognized his malady as ear vertigo, and sent him to me for operation.

Examination at that time revealed a normal membrana on the left side, but profound deafness; conservation of bone conduction for the tuning-fork; constant tinnitus; general health excellent; unwillingness to conduct his car for fear of vertigo and falling.

Having established the existence of chronic tympanic vertigo in this case, removal of the incus was proposed, the patient placed in a private room of the Presbyterian Hospital, and on October 18, 1898, he was etherized, and the external auditory canal sterilized with formalin solution (1 : 1000) and illuminated by an electric head lamp. A long incision was then made in the posterior periphery of the membrana, beginning behind the short process of the hammer and running almost half-way around the membrane. There was no bleeding, and the incus-stapes joint was thus well exposed. The incus was then detached from the stapes by my incus hook-knife, drawn downward into the atrium, and removed by slender foreign-body forceps (Sexton's pattern). The stapes head was now plainly seen, and when touched with a probe was found to be normally movable. The next day the stapes was plainly visible in position. The hearing for the voice apparently slightly increased. A little discharge of clear, pink serum came from the ear. Tinnitus unchanged. There being no tendency to vertigo, the patient began his work as car conductor four days after the operation, and has continued to do so up to the present time, though ten days after the operation he took cold, and had a mild attack of acute otitis media in the ear operated upon. This ear discharged for a month and then ceased, the perforation closing. December 2, 1898, I made a note that the deafness was still great and the tinnitus continuous in this ear, but there was no tendency to vertigo, to relieve which the operation was performed. The patient is able to do full work, and was on duty twenty-six hours during the recent great snow-storm.

In the case reported above parotitic metastasis occurred in the left internal ear and probably some degree of catarrhal inflammation in the middle ear. The metastasis in the labyrinth produced engorgement of that cavity and destruction of hearing, but not of the special irritability of the ampullæ of the semicircular canals. The ready mobility of the stapes in this case, as was demonstrated by a probe at the time of the operation, rendered the patient specially liable to an attack of vertigo from a sudden retraction of the ossicles by the tensor tympani, impaction of the stapes upon the over-distended labyrinth, and consequent undue compression of the ampullæ. Such liability has been overcome by the removal of the incus and the consequent destruction of the retractive power of the tensor tympani and malleus upon the stapes.

A CASE OF ISOLATED URTICARIA OF THE TONGUE, ASSOCIATED WITH ACHLORHYDRIA.

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AND

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Occasionally in individuals affected by urticaria of the skin the mucous membrane of the mouth becomes the seat of analogous manifestations. Such an involvement receives but brief mention from writers on diseases of the skin, while an isolated occurrence of urticaria upon the oral mucous membrane has apparently not hitherto been observed.

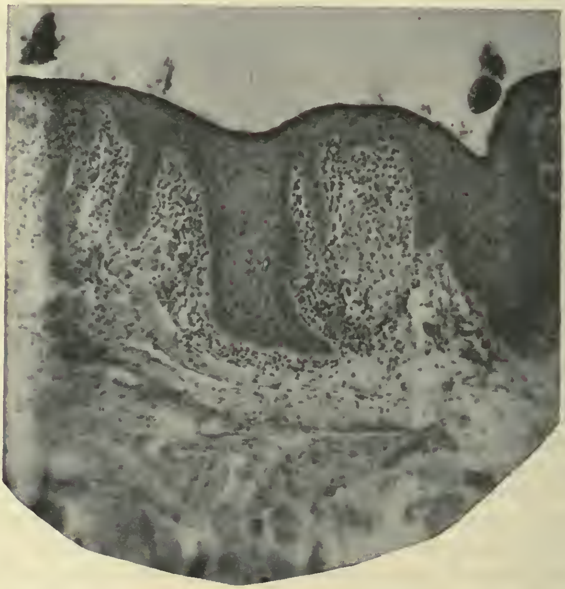
The following case seems to be unique so far as is indicated by an examination of the literature:

Local phenomena. The patient, a man, aged thirty-eight years, shoemaker by trade, was first seen October 16, 1897, for soreness of the tongue. He stated that four years previously reddened, sensitive areas made their appearance on the dorsum of the tongue, coming and going irregularly for several months, later increasing in frequency of occurrence as well as in soreness, until two years ago, when he was obliged to give up his work, in which it was necessary to hold shoe tacks in his mouth. Owing also to the sensitiveness of the tongue, he discontinued the use of tobacco, which he had formerly smoked and chewed freely. For the past two years the lingual dorsum has been almost constantly affected by sore, red areas. Recently the mucous membrane of the cheeks and lips has occasionally shown similar manifestations. The skin has at no time exhibited an eruption, so far as he can recall.

When first seen by the writer (J. L. G.) the oral cavity presented the following appearances: The dorsum of the tongue from the circumvallate papillæ to within a centimetre of the tip presents, with the exception of a normal-looking oval area in the centre, about one by one and a half centimetres in diameter, conspicuous alterations of the surface. In this affected region the filiform and fungiform papillæ are moderately and symmetrically enlarged, are brightly reddened, and pass abruptly without other line of demarcation to the normal epithelium in the centre and at the tip of the tongue. The reddened area is traversed irregularly by conspicuous furrows and wrinkles, which can be smoothed out with the fingers, and show no actual abrasion or fissuring of their surface. There is no induration or palpable alteration in consistence anywhere apparent. The normal-looking mucous membrane at the tip of the tongue and over the oval area in the centre previously referred to is smooth and without furrows. The mucous membrane elsewhere in the mouth presents nothing abnormal. The condition of the teeth was good.

The affected portion of the tongue exhibits marked sensitiveness to mechanical, chemical, and thermic irritants. No change in acuteness of taste was apparent. Pruritus or spontaneous pain was not present.

FIG. 1.



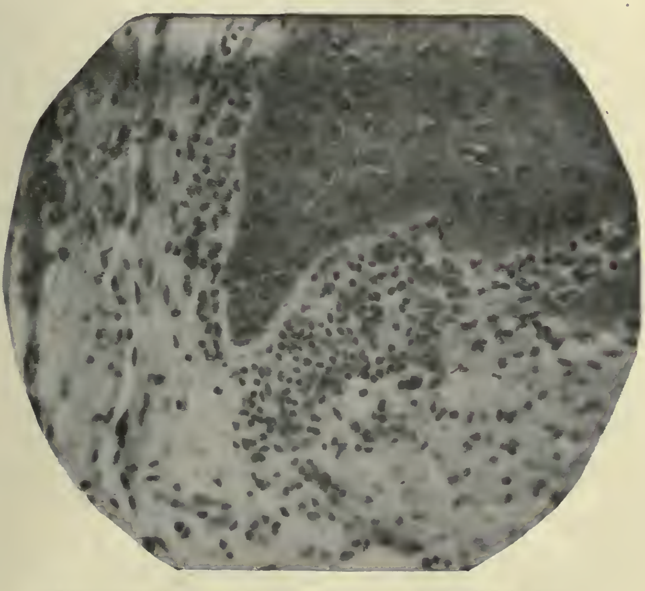
The rete mucosa shows numerous mitoses in its inferior portion. In the corium a pronounced round-celled infiltration is seen, together with several small areas of œdema. Eosin and alkaline methylene-blue. Zeiss apochrom. object. 16 mm., project. ocul. 2.

Pathological anatomy. A portion of the reddened area from the dorsum of the tongue was removed, including some of the adjacent normal-looking mucous membrane. Sections stained with polychrome methylene-blue after hardening in Zenker's fluid showed the following appearances: In the region corresponding to the macroscopically swollen and reddened mucous membrane the horny and squamous layers of the epithelium appear essentially normal, but the rete mucosa exhibits an unusual number of mitoses in its inferior portion. In the intercellular spaces a few polymorphonuclear neutrophiles are found irregularly scattered.

The corium exhibits irregular deficiencies throughout its extent, though most markedly immediately below the mucosa. These deficiencies are formed by a separation of the fibres of the corium, and are due to an œdema and not to disturbance of the tissue from the cutting, since, if sections are stained according to Unna's method by acid orcein, the deficiencies are seen to be traversed irregularly by delicate strands of fibres given off from the neighboring bundles.

In the vicinity of these widened lymph-channels of the corium there is an increased number of both fixed and free cells. The former have a vesicular nucleus, with more or less cytoplasm, and resemble the endothelial cells of the capillaries. The walls of the capillaries exhibit an increase in thickness amounting to two or three cell-layers. The endothelial cells show a distinct swelling of their cytoplasm and apparently of their nucleus. Here and there are found *mastzellen* irregularly distributed through the corium, never more than two or three in a field.

FIG. 2.



Same specimen. Zeiss apochrom. object. 2 mm., project. ocul. 2.

In the neighborhood of this endothelial proliferation there is a distinct cellular infiltration, consisting of polymorphonuclear neutrophiles and smaller cells with deeply staining nucleus and a narrow margin of cytoplasm resembling the small lymphocytes of the blood. These infiltrating cells extend in a scattering fashion to the submucosa. The bloodvessels of the corium contain a considerable number of both these forms of cells. There were no cells found having the character of plasma cells or of eosinophiles.

The process appears, histologically, to consist in a proliferation of the endothelial cells of the corium, accompanied by œdema and leucocytic infiltration in the neighborhood, together with a heightened proliferation of the cells in the rete mucosa.

Frequent examination of the tongue during a period of several months showed a rapid, continual shifting in position of the reddened areas. These were generally rounded or oval in outline and exhibited no tendency to the formation of serpiginous or gyrate figures. The eruption appeared to arise evenly and simultaneously over a given area, subsiding in a like manner. Occasionally a transitory reddening of the mucous membrane of the cheeks and lips was noted, lasting a day or two and attended by local sensitiveness to irritants. At no time was an excessive epithelial exfoliation noted, such as is seen in superficial wandering glossitis (geographical tongue; Moeller's superficial glossitis).[1]

Local applications and mouth-washes of various kinds, soothing, antiseptic, and stimulating, were employed at different times, but no effect upon the local manifestations was apparent.

The local clinical phenomena, in connection with the histological examination, led to the belief that a condition of the lingual mucous membrane existed analogous to and essentially identical with that characterizing urticaria of the skin.[2]

General phenomena (reported by H. F. H.). The patient was subject to more or less constant symptoms of digestive disturbance, and it seemed wise to investigate this aspect of the case, both with the idea of relieving these symptoms and the condition which might underlie them and also in the hope that such an investigation might throw some light upon the cause of the local condition in the tongue.

The history of the digestive disturbance covered a period of eight years. For the last four years the character of the trouble has been constant, of the same type as at present. Before that time the patient suffered from occasional attacks of an acute nature, consisting of nausea, morning vomiting, much distress, and vomiting after ingestion of food. These attacks generally followed a spree of alcoholic indulgence. They lasted in some cases a few days, in some two or three weeks, and became progressively more frequent and of longer duration until the patient gave up hard drinking, four years ago.

The symptoms during the last four years and at the time of investigation have been as follows:

Upon rising in the morning there is a sense of nausea and unrest in the stomach, a bad taste in the mouth, much eructation of tasteless, unirritating gas.

Immediately upon ingestion of food, perhaps within five minutes, there is a feeling of fulness and distress in the stomach, which frequently increases to a dull pain. The patient has to lie down for one-half hour until the distress lessens. During this period of distress, lasting one-half to one and one-half hours, there is constant regurgitation of food and much eructation of gas. The regurgitations begin at times before the meal is finished. The food is brought up in mouthfuls. As a rule, it is swallowed again, but occasionally is ejected. The regurgitated food is unirritating and of a somewhat sour taste throughout the whole period of regurgitation. In time past the later regurgitations, at an interval of an hour or more after the ingestion of food, have been acid and burning, but for the last year no acid taste has been noted at any time. There is no vomiting unless induced by the patient to relieve the distress, and then never of large amounts.

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[1] See this JOURNAL, November, 1896.

[2] My thanks are due Dr. James H. Wright, director of the laboratory of the Massachusetts General Hospital, for valued assistance in the histological examinations, and to Mr Brown, of the laboratory, for the preparation of the micro-photographs.

The symptoms occur after each meal of ordinary amount. They do not occur, or are slight, after a meal consisting of a small quantity of milk or bread and milk, or a small piece of beefsteak, but do occur with a large quantity of milk alone, or with any mixture of food sufficient to satisfy the patient's appetite. These latter facts were learned by experimentation while the patient was under my charge. The appetite is somewhat excessive.

Three hours after a meal the sense of discomfort is gone and returns only upon ingestion of food. At periods of from one to two hours after a meal the patient has spells of extreme drowsiness associated with languor and muscular relaxation. The condition is one of torpor, not sleep. All capacity of mental attention lapses. the body is completely relaxed, and saliva runs from the mouth. The spell endures one-half to one hour. It is often followed by a dull headache and general sense of malaise and inertia.

The bowels are regular. There is much intestinal gas, frequently discharged, of foul odor. The general health is poor. The strength is less good than formerly, and there is much inertia. The weight has been constant for the last two years, but is much below his former weight. These, together with the disturbance arising from the condition of the mouth described by Dr. Goodale, are all the symptoms of which the patient complains at the present time.

The family history is good.

The patient was healthy as a boy, but thinks that he ruined his constitution by excessive indulgence in tobacco and alcohol during a period of years culminating about four years ago. He admits much sexual indulgence; has had gonorrhœa, but never syphilis.

Examination. The patient is thin, not emaciated; skin sallow; pupils normal; color vision normal. The reflexes normal. Examination of thorax negative. Evidence of abnormal condition was found in the mouth as described, in the blood, in the urine, and in the digestive tract.

The urine was pale. Specific gravity 1017. Albumin present in slightest possible trace. Indoxyl increased.

Sediment contained a few small, hyaline casts, with occasional cell and abnormal blood-corpuscles adherent.

The blood showed evidence of slight anæmia. The hæmoglobin was reduced. There was evidence of some degeneration in the corpuscular elements. No evidence of pernicious anæmia.

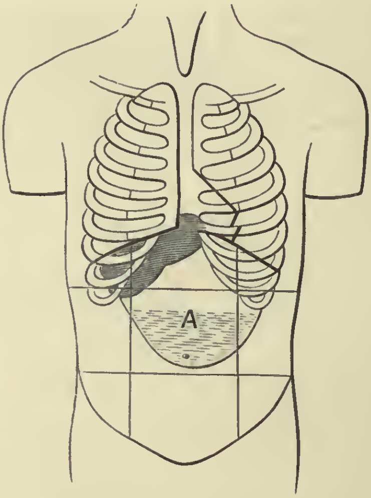
The condition of the mouth has been described.

The stomach-tube was passed in the fasting stomach twelve hours after the ingestion of food. Forty c.c. of residue were withdrawn. The contents were of green color and contained bile. The reaction was alkaline. The sediment contained mucus, few epithelial cells, yeast fungi, very few remains of food. There was practically no evidence of stasis or of hypersecretion.

The empty stomach extended by percussion to one finger above the umbilicus. No tumor palpated.

With inflation the lower border of the stomach extended slightly below the umbilicus. With distention with one litre of water the lower border sank to two fingers below the umbilicus. Electrical illumination of the stomach demonstrated the lower border at from two to three fingers below the umbilicus. The lowest point was about one inch to the left of the median line. (Fig. 3.) The upper border was apparently in the normal position. The viscus moved up and down with forced respiration. The capacity of the stomach was 1800 c.c. The spleen was in normal position. The edge of the liver could be felt just at the costal border in the right hypogastrium. The transverse colon was prominent, in normal position, and filled with gas.

FIG. 3.



The gastric contents expressed one hour after an Ewald test-meal, consisting of one roll and one glass of water, showed the following characteristics: The food appeared much as when it leaves the mouth for the stomach.

Quantity 80 c.c.; odor normal; reaction acid to litmus; no free acids present to Congo-red test; no free HCl present; no lactic, butyric, or acetic acid.

Ewald's modification of Sjoqvist test for combined HCl gave a negative result. Total acidity 0.36 gramme per mille. Rennin present, about one-quarter normal. 0.2 per cent. HCl forced into the stomach and withdrawn showed the presence of small amounts of pepsin. The filtrate of the contents did not digest coagulated egg-albumin in twenty-four hours. Starch digestion advanced. Contents obtained in a similar manner at periods of from three-quarters to two hours after a test breakfast upon ten occasions showed similar characteristics. Free HCl and combined HCl were never present. Lactic acid was never present to the clinical tests. The total acidity varied upon different occasions between 0.2 gramme per mille and 0.4 gramme. The contents were present in the stomach two hours after the meal, and upon two occasions two and a quarter hours after. The stomach was empty two and one-half hours after the meal. The amount of contents varied between 80 and 140 c.c. The contents of the fasting stomach varied in amount from 20 to 40 c.c. upon four occasions.

The acidity of the contents was due presumably to the test-meal, which in infusion had a total acidity of 0.4 gramme per mille.

The evidence of the clinical examination of the stomach showed, therefore, entire absence of the secretion of hydrochloric acid; some but diminished secretion of pepsin and of rennin; no digestion of proteid food; diminished motility. The size and position of the stomach were normal.

The condition of achlorhydria such as we have in this case occurs in conditions of atrophy of the glandular structure of the gastric mucous membrane. In cases of complete atrophy the process is said to include the cells in which the pepsinogen and rennet zymogen are elaborated, so that no traces of pepsin or of rennin can be obtained in the contents or in the acid wash-water.

It is not uncommon, however, to find traces of these ferments present in certain stages of atrophy of the stomach when the acid secreting cells have become absolutely unproductive. Certain authorities, as Van Noorden, Martius, claim that a total absence of ferment zymogen occurs in no diseased condition. This case may then be one of atrophy of the gastric mucous membrane where the atrophy has not as yet become entire. The pathological process present may be one of chronic gastritis with progressive atrophy of the glandular structure.

Achlorhydria may, however, occur as the result of a permanent disturbance of the nutrition or innervation of the gland-cells unassociated with the pathological changes in the cells which occur in atrophy. It is stated that a majority of the cases of achylia gastrica are of this nature.

It is impossible in this case in hand to determine definitely whether the pathological condition underlying the achlorhydria is one of atrophy or of disturbance of innervation of the cells.

The record of prolonged alcoholic abuse and the history of the progress of the case argue for the former condition, the so-called gastritis atrophicans.

The treatment indicated and advised was a diet consisting of food of a nature which would not irritate or burden the stomach, administered in moderate quantities in five meals daily, with reliance upon the intestinal function for digestion.

The patient was given a powder consisting of capsicum and sodium bicarbonate for the relief of the distress after meals and particularly the sense of craving for whiskey, which the patient was accustomed to satisfy at that time. Strychnine, grain $\frac{1}{25}$ t. i. d., was given to improve the motility, and belladonna to control the excessive salivation. It was obviously impossible to restore gastric digestion in this case, as the patient would have needed two quarts of dilute HCl at a meal to accomplish this.

Under this treatment the condition improved. At the end of one month of steady treatment the spells of distress after meals had practically disappeared, and the patient never had to lie down as formerly. The regurgitation had become very infrequent. The capsicum had quite taken the place of the whiskey.

All medicines except the strychnine had been discontinued.

The drowsiness was less, but was still present. The urticaria persisted unchanged.

After the commonly stated hypothesis that urticaria may be secondary to a condition of intestinal sepsis, it seemed possible that the urticaria in this case might be the result of a condition of intestinal sepsis consequent upon the absence of the natural antiseptic of the food in the upper intestinal tract, the free HCl, from the stomach. There were no direct symptoms of intestinal sepsis except, perhaps, the drowsiness and intestinal flatulency. It was determined, however, to treat the patient for a possible intestinal sepsis as a causal factor of the urticaria.

As stated, it was impossible to utilize the natural antiseptic, free HCl, in this case, so an artificial antiseptic (salol) was used. Five grains of salol were given from two to three hours after three of the meals. The diet was continued as before.

In the course of the next week some improvement was noted in the tongue by the patient; the soreness was still constant, but less marked, and the reddened areas appeared of less extent.

In the course of the second week the urticaria disappeared entirely from the surface of the tongue.

During the third and fourth weeks no soreness or redness upon the surface of the tongue was noted by the patient, and none was found upon examination. Under salol there had been practical immunity during a period of three weeks. Previous to this time the soreness had disappeared upon occasions for a day at a time, but never for a longer period during the several years of the disturbance. At the end of the fourth week the salol was discontinued.

In the course of the next week the urticaria reappeared upon the surface of the tongue and became again constant during the next week.

Benzo-naphtol was then administered in place of salol in doses of four grains six times a day. The condition of the tongue again improved with this treatment, but a continuous immunity, such as occurred under salol, did not obtain during the two weeks in which the benzo-naphtol was given. Upon resumption of the salol the relief of the condition again became entire and constant, and has so continued during the last month. The improvement of the condition under the benzo-naphtol as well as with the salol would tend to show that the result was due to an antiseptic action, which property these two drugs possess in common, and not to a specific action of the salol. The action was more efficient in the case of the salol. The case is to be further investigated in regard to the action of other drugs of this class of antiseptics. With the improvement in the urticaria the spells of drowsiness have to a great extent disappeared. The intestinal flatulency has also become much lessened.

The urine has shown no evidence of a deleterious effect of the salol upon the renal functions.

The condition of the stomach has remained good as far as symptoms are concerned. The symptoms of distress after meals and of regurgitation occur at present very infrequently.

The stomach is not infrequently empty two hours after an Ewald meal, while during the first two months of treatment the emptying never occurred before two and one-half hours This suggests an improvement in the motility of the organ. The condition of the secretions is unchanged.

The patient is much stronger and works regularly.

At the time of writing there is no evidence of urticaria upon the tongue and there has been none during the last month.

[NOTE.—September 1, 1898. The patient having changed his residence, no further experimentation has beenp ossible. Three months after this article was sent to press patient wrote that no return of urticaria had occurred. During these months had taken salol gr. iij three times daily for four successive days of the week, omitting it on the other three days.]

ENTERO-PLASTIC OPERATION TO OVERCOME OR PREVENT STENOSIS, WITH ESPECIAL REFERENCE TO THE SPUR IN PRETERNATURAL ANUS.

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THE principle of overcoming a stenosis of a canal by transverse union of a longitudinal incision, as applied by Heinecke-Mikulicz on the pylorus and by me on the ureter, is applicable in any portion of the intestinal tract below the duodenum wherever the mechanical conditions will permit.

The longitudinal incision or opening should be made in the middle of the convex surface—that is, equidistant from the two sides of the mesentery, so as not to interrupt blood-supply by the division of large vessels in the intestinal wall. Free mobility of the loops of intestine and intact peritoneal covering are desirable conditions, but the latter is not absolutely necessary. In places where the intestine has no mesentery and where there is a limit to the infolding or bringing into apposition of the convex surface or the surface of the intestine opposite the mesentery, as the cæcum, extraperitoneal border of the rectum or flexures of the colon, there is a limit to the length of the longitudinal incision. In an organ so free and movable as the small intestine, I see no reason why I could not unite the convex surface to an extent of five or six inches, or more, if this would be desirable. In fact, I see no other limit than that of the length of the mesentery, the time required for suturing, and the length of the wound. It is evident that the length of the longitudinal wound should not be unnecessarily great.

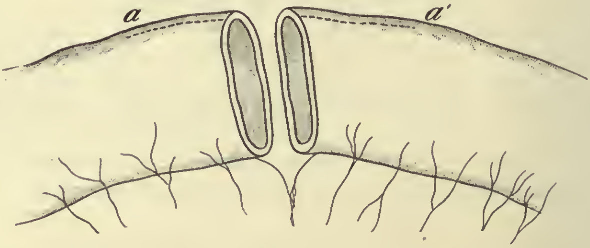
When there is no mesentery, and consequently only slight mobility, for folding in or apposition of the convex free surface of the intestine, or where the mobility is diminished or lost by diffuse inseparable adhesions, there is, of course, a limitation to the application of this principle.

In one case of stenosis of the cæcum from tuberculosis, with remittent attacks of pain from incomplete occlusion, in which I did not deem excision of the cæcum advisable, I made this plastic operation, uniting transversely an incision of about four centimetres in length. The operation gave partial relief only, and a fecal fistula resulted, which necessitated an ileo-colic anastomosis, which was followed by relief of the symptoms of the stenosis and left the fistula secreting mucus, as a rule, with, very rarely, some fecal matter.

Tension in the united wound and lack of free fecal passage at the place of operation are, when the sutures are applied correctly, undoubtedly the main cause of non-success—that is, of spontaneous reopening of the sutured intestine.

This plastic operation, when applied to resection and circular suture, will enable us to avoid narrowing of the intestine by folding in of its wall at the place of suture (Fig. 1). If, for the sake of additional safety, it is deemed desirable to apply a second row of sero-muscular sutures at a distance of one-half centimetre from the first row, the advantage of having a larger amount of serous surface in contact is counterbalanced by the increase in size of the circular fold. The narrowing effect of a large fold can be overcome entirely by the plastic operation, because we can make the longitudinal division long enough to secure a circumference of any size desired.

FIG. 1.



The same principle is applicable when we wish to unite an intestine of small calibre end-to-end with one of large calibre. By longitudinal division of the smaller intestinal tube the line of union is easily made to correspond to that of the larger tube. If the lumen of the larger intestine is not deemed sufficiently wide to permit of so much folding in as is required, a longitudinal division is also here resorted to, until at last as large a line of union as we deem desirable is secured.

In artificial anus, whether this be the result of a premeditated operation or of an accident, where the mucosa of the intestine is finally united to the skin, it is commonly observed that the so-called spur forms a more or less complete obstruction to fecal passage from the proximal into the distal portion of the intestine. The spur, so to speak, leads the bowel-contents from the bowel out through the opening in the skin. The distal portion becomes small and retracted from non-use.

The spur is formed by a semicircular fold or group of folds located opposite to the opening through the abdominal wall at the place of the bend of the opened intestine. This semicircular fold may increase so as to extend entirely around the lumen of the intestine, thus becoming a circular fold, and is then located at the end of the proximal portion of the intestine close to the opening in the skin, through which it may protrude as a prolapse of the mucosa or wall of the proximal bowel. When this spur is well developed it may form, even when the intestine is loosened from the abdominal wall, an impediment to free fecal passage that frustrates simple transverse or longitudinal suture of the intestinal opening, and consequently necessitates resection of the loop containing the spur.

As resection with subsequent circular suture is as yet an operation of some gravity, it would be an advantage to avoid resection and still overcome the stenosis and the influence of the spur with a more simple operation. That this can be done by application of the principle of the transverse union of a longitudinal wound I propose to show by the following case:

A. T., male, aged fourteen years, an American of German descent, entered the German-American Hospital, for operation, in my service, on April 2, 1898.

Family history. Father, mother, brothers, and two sisters living and healthy. One sister died of perityphlitic abscess. Grandparents, uncles, and aunts living and healthy, or cause of death unknown. Paternal grandfather died in old age of diphtheria. One paternal cousin had operation for appendicitis in 1894.

The patient's personal history was negative as regards disease or injury.

Present illness. On the evening of March 22, 1897, the patient was seized with acute pain in the abdomen below the level of the umbilicus; the pain was generalized, very severe from the first, and of a severe aching, griping character, and was accompanied by vomiting and diarrhœa. He had elevation of temperature, but no chill until the following day. The pain lasted throughout the night, but in the morning it was not so severe and the patient walked about outdoors. At noon he had a chill and went to bed. Nausea and slight diarrhœa were present. Severe abdominal pain in the lower half of the abdomen came on at two o'clock the next morning and continued with remissions for two weeks, accompanied by daily elevation of temperature.

A physician was called on March 24th, who made a diagnosis of appendicitis. On April 5th the perityphlitic abscess was opened in narcosis. Fecal matter, with pus, escaped from around the appendix at the time of operation.

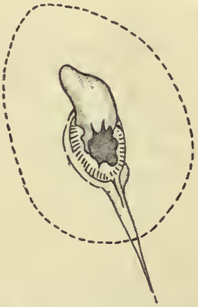
From this time until April 2, 1898, when I operated, a fecal fistula had existed, which has discharged a varying amount of feces daily. For the first eight weeks after the operation from one-fourth to one-eighth of the feces passed through the fistula and the remainder by the rectum. The rectal discharges were normal in color and occurred once daily. At the end of eight weeks the fecal discharge through the fistula decreased rapidly, so that it amounted only to a moistening of the dressings three times a day with fecal matter. About this time the wound was explored for gauze, which was supposed to have gotten into the intestine. After this exploration there was an immediate increase in the amount of fecal discharge through the fistula, which continued up to the time of operation. He has usually had about four to six evacuations daily through the fistula, varying from a drachm to three ounces, but ordinarily about one ounce. The feces were of normal color and soft, but not liquid. The amount of feces passed per rectum appears to be about the same as before the fistula was formed ; the character is normal ; the bowels are regular and there is no tendency to diarrhœa.

Relief from pain immediately followed the opening of the perityphlitic abscess and he has felt well ever since, with the exception of a few hours after the operation.

Operation, April 2, 1898. After the usual preparation, liquid diet and irrigation of the bowels through the fistula in another room, without using a rubber tube to push the spur back or down, he was brought to the operating-room. When he was put upon the table feces welled out. There were present at the operation the doctors from the Polyclinic. Drs. Haiselden and Buford assisted, and Dr. Gottschalk administered the ether.

The fistula was located in the right inguinal region, an inch to an inch and a half from Poupart's ligament, or from the anterior superior spine of the ilium. The opening was six centimetres in circumference, two centimetres in diameter, and would admit the little finger. The mucosa of the intestine was united to the skin, that is, the fistula was labiate. The mucosa bled when the finger was introduced. A tongue-shaped flap of mucosa, one centimetre square, protrudes when he strains. It comes out of the upper, outer corner of the fistula, and can be easily replaced. The fistula is surrounded by excoriated skin for an inch or more (Fig. 2).

FIG. 2.



Prolapse of tongue-shaped mucosa. Opening passable for the little finger. Dotted line indicates incision for cutaneous flap.

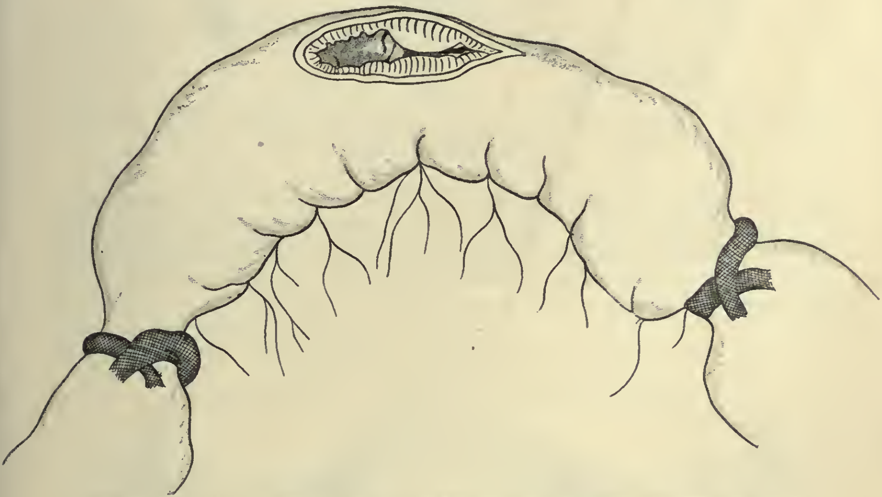
The fistula was now circumcised, one centimetre and a half from its border, through the skin, subcutaneous tissue, and abdominal muscles, down to the transversalis fascia (Fig. 2). This circular flap, like a collar, was loosened and closed tightly by a continuous silk suture so that none of the intestinal contents could pass out.

The abdomen was then disinfected and clean covers put on the table and the patient.

I now opened the peritoneal cavity one inch medial to and above the fistula, using great care to avoid adherent intestine. The omentum met with at first was ligated in portions. The isolation of the loop with the fistula was relatively easy. It was found to be a loop of small intestine, and was surrounded by gauze sponges, freed from adherent omentum and held aside out of the abdominal wound while search was being made for the cæcum and appendix. The wound was packed with several sponges, the parietal peritoneum united to the skin, the branches of the inferior epigastric artery ligated, and the incision prolonged up and down in the sheath of the rectus muscle.

The cæcum was found to be free from adhesions and the appendix was adherent to the cæcum. The end of the appendix was dilated, fluctuating, and contained a fecal concretion.

FIG. 3.



Proximal end of gut incised through prolapsed mucosa; spur seen on mesenteric side, within gut.

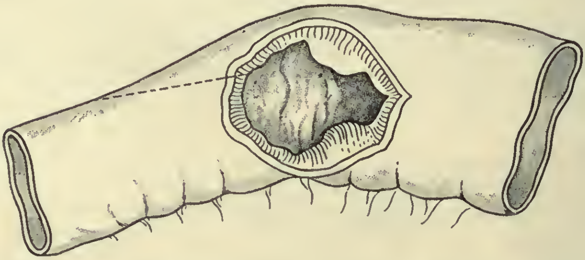
The appendix was amputated and the stump buried under a musculo-serous circular flap.

I now proceeded to operate on the fecal fistula, which was found to be located two feet above the cæcum. The loop of the ileum containing the fistula was pulled well out of the wound and surrounded by gauze. The loop was emptied and ligated by means of gauze strips, two to three inches on each side of the fistula (Fig. 3). The adherent omentum was dissected off from the intestine, which necessitated only a few ligatures. The abdominal-wall flap was then cut off from the border of the fistula.

The fistula appeared as a round or oval opening one-half to an inch in diameter on the convex surface of the ileum, half to three-quarters of an inch from the mesenteric border on each side (Fig. 3). The tongue-shaped flap of mucosa was found to be part of a circular fold hanging down from the proximal border of the fistula, continuous with the spur, and forming with this a circular prolapsed and invaginated valve or flap.

It was evident that a simple union of the fistulous opening either in a transverse or longitudinal direction would not do away with the stenosis caused by this ring-shaped valve of the mucosa, and consequently would not remove the impediment to the passage of feces at this point, because this ring of mucosa would protrude into the lumen of the intestine and perhaps be the beginning of an invagination, or would at times at least impede fecal circulation.

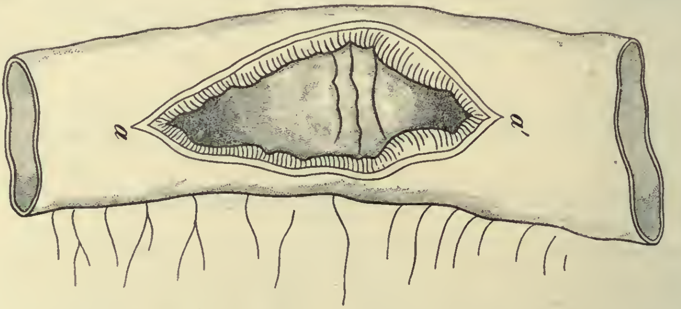
FIG. 4.



Wound in ileum held out, showing spur, viz.: A counter fold or group of folds of mucosa. Line of incision 1 inch down into distal (smaller) portion of ileum.

I believe that the spur or circular valve, by causing a disturbance of fecal circulation, is the cause of the common failure of permanent closure of the fistula following simple suturing of the intestinal opening. The fistula reappears in a week or two and reopens because of the spur which remains.

FIG. 5.



The whole of incision, viz.: the longitudinal wound in the ileum at middle of convex (opposite to mesentery) border. 1 inch up, 1 inch down; width of fistula ½ inch = 2½ inch. *a* lower and *a'* upper corner to be united by a guide suture left long.

I therefore decided to overcome the effect of the spur by the following plastic operation on the intestine:

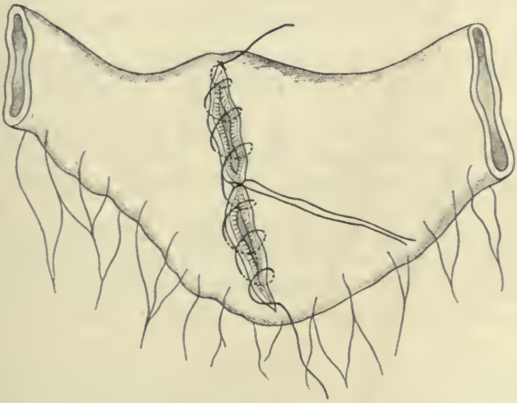
1. A longitudinal incision at the convex border of the intestine one inch in length in the proximal end of the intestine through the tongue-shaped valve, up into the normal intestinal wall above it (Fig. 3).

2. A longitudinal incision, one inch long, into the distal or narrower portion of the intestine below the spur, thus making a longitudinal wound two inches in length on the convex border of the intestine

(Fig. 4). As the original fistulous opening was two centimetres in diameter, the wound would be about three inches in total length. Upon making the incision at the upper end of the wound I saw a Peyer's patch.

The spur formed a circular valve of two or three parallel folds of mucosa, half an inch broad, most pronounced on the mesenteric side, extending around the entire circumference of the intestine, but smaller on the convex border (Fig. 5).

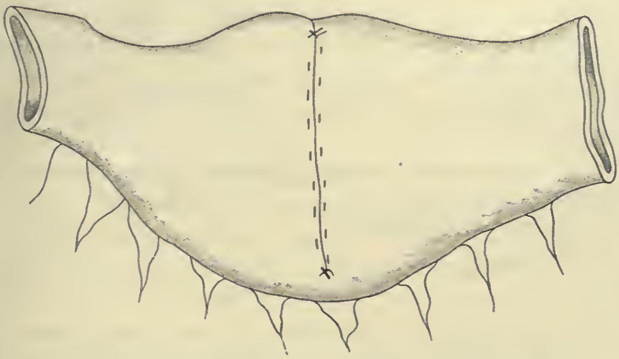
FIG. 6.



Continuous suture. Lies through whole thickness of wall, aided by the guide suture.

3. Transverse union of this longitudinal wound (Fig. 6).

FIG. 7.



Sero-muscularis continuous suture to bury the preceding suture.

a. Suture *a–a′* (Fig. 5) united the upper and lower corners and was left long for traction, dividing the wound into two transverse halves with the suture in the middle.

b. A continuous silk suture through all the layers of the intestine (Fig. 6).

c. A continuous serosa-muscularis suture, one centimetre outside of the former.

d. A second continuous serosa-muscularis suture to bury the former (Fig. 7).

4. Disinfection of the sutured loop with 1 : 1000 sublimate solution, and removal of the gauze ligatures around the loop of intestine.

5. Removal of the sponges and examination of the abdomen for hemorrhage.

6. Step sutures of the abdominal wall.

7. Gauze drain down to the appendix and over to the sutured loop of the ileum.

8. Injection of two quarts of physiological saline solution into the rectum.

The operation lasted three hours and a half. At its close the patient's pulse was good ; no shock.

7.30 P.M. Gaseous distention of the abdomen. A little gas escaped after insertion of the rectal tube.

April 3d. Patient had a small dark-green and very thin bowel movement. Throughout the day he had considerable trouble on account of gaseous distention, for which injections of warm water and peppermint were made, but little gas passed. Temperature 97.4° to 100.2°. Pulse 120 to 130.

4th. A small amount of gas passed after injection of peppermint water. During the day he vomited several times, dressings were changed, half an ounce of bloody fluid, with some bright yellow pus, followed the removal of the packing. A drainage-tube was introduced. Temperature 98.4° to 100°. Pulse 100 to 108. During the day he had two small bowel movements.

5th. He passed considerable gas and had two dark green, thin bowel movements. Temperature, 99.2°. Pulse, 90.

6th. Slept well last night. Temperature 99.6°. Pulse 76. The drainage-tube was removed, half an inch cut off, and reinserted. Dressings were dry.

7th. Temperature 99.6°. Pulse 66. A large bowel movement followed the use of enemata.

8th. Temperature 99.4°. Pulse 56. Tube removed.

11th. Temperature 98.4°. Pulse 68. He has no pain. Eats and sleeps well.

24th. Only a granulating surface remains. The function of the bowels is normal.

October. Patient remains well.

269 LA SALLE AVENUE.

CRITICAL SUMMARY OF RECENT LITERATURE

ON THE

TREATMENT OF ABSCESS OF THE BRAIN.

By Joseph Collins, M.D.,
of New York.

Viewed from a therapeutic stand-point, abscess is by all means the most important disease to which the brain is liable. Its causation is well known; its pathogeny is clearly understood; its treatment calls for one measure, viz., prompt surgical interference. A few years ago the hopelessness of cases of brain abscess was appalling. To-day surgical treatment offers a far greater prospect of cure than in any other intracranial lesion. The inevitable course of abscess in the brain being to death, which medical treatment has no influence to delay, it behooves us to recognize the gravity of the condition, and when face to face with the indications of such disease to utilize early and vigorously the only means in our power to cope with it. That this statement is entirely true no one will be likely to deny. Despite the recognition of its truthfulness, and the wide-spread acceptance of it, the literary records of each succeeding year show that the mortality rate of abscess of the brain has not fallen as it should have done. This result may be attributed to two factors: First, to lack of early recognition of the disease, apart from its localization; and, second, to the fact that surgeons are oftentimes not sufficiently assiduous in their search for it. That the mortality-rate of abscess of the brain is not so great to-day as it was several years ago is due not alone to the fuller comprehension of its amenability to surgical treatment, but to an understanding of the relationship existing between it and certain preventable and curable diseases to which it is secondary. Thus, the requirements of modern surgery are such that wounds of the soft and hard parts of the head are maintained aseptic. Therefore, this causation of brain abscess (and it will not be forgotten that, according to the statistics of some, nearly one-half of all the cases are of this origin) has succumbed, in a measure, to the advancement of medical science. The fact that a third of all cases of intracranial abscess are secondary to otitic and rhinitic diseases which are amenable to treatment is generally recognized, but not generally heeded. Certain it is that the general practitioner is not sufficiently insistent upon examination of the ear after the occurrence of infectious disease, and not sufficiently persistent in the treatment of otitis media when it is found. The other sources of brain abscess, viz., the metastatic, are not so submissive to prophylactic treatment. Therefore, they continue to occur with about the same frequency as before.

An examination of the literature of the past year shows that physicians are recording their examples of failure and success in the treatment of brain abscess in an encouraging way. It is proposed to make a brief review of the more important of these cases, and, if possible, to point a moral.

Saenger[1] records the case of a man, twenty-eight years old, who, one year before coming under observation, had double otitis media. Six months later the right malleus and incus were extracted. After a month he was complaining of continuous pain in the forehead, alleviated by antipyrine, ice-bags, and aural irrigation. A few months later he complained of headache, vertigo, vomiting, and stupidity. Examination showed defective innervation of the left side of the face and slight left hemiparesis. The reflexes were somewhat exaggerated on the left side of the body. Sensibility of the left arm and forearm was diminished, especially the pain-sense. Ophthalmoscopic examination revealed bitemporal paleness of the optic disks. The pulse-rate was about 50, and the temperature was normal. Percussion of the right side of the forehead and the right temporal region caused great pain. It was finally decided that there was left homonymous hemianopsia, which, in connection with the symptoms, pointed to abscess in the posterior pole of the right hemisphere. The patient's skull was trephined over the indicated area and a hollow needle thrust into the brain in different directions, but no pus was found. The patient died seven days later, and on autopsy an abscess was discovered in the right occipital lobe. Here, then, is a case of abscess of the brain in which the symptoms pointed decidedly to intramedullary involvement of the right occipital lobe, with slight encroachment by the surrounding encephalitis on the parietal convolution. The occurrence of left homonymous hemianopsia pointed unequivocally to this. The case teaches that when the diagnosis is reasonably sure, and there are coexisting symptoms pointing to its location, the surgeon should be asked to make greater exploration than that possible through a small trephine opening. The unmolested case terminates in death, and nothing is to be lost from making most extensive exploration. It teaches, moreover, that in a case in which the symptoms of brain abscess had existed for such a long time the opening of the skull should not be so delayed as it was here.

Steiner[2] reports the case of a young man of inherited and personal tuberculous history who developed suddenly lameness of the right hand. The next day he had severe headache, general weakness, and right hemiparesis, including the face, especially the angle of the mouth. Examination showed exaggeration of both patellar reflexes, with right side foot-clonus. The pulse-beat was irregular, varying from 60 to 70 per minute, and the temperature was slightly elevated. Diagnosis: cerebral embolism of classical location. There then followed gradual retrocession of the symptoms, so that a month later they had almost entirely disappeared. A few weeks later he complained of headache, and after a few days he was found dead in bed. The autopsy revealed a large cavity occupying the entire posterior third of the left hemisphere, partially filled with clear, thin fluid containing pus. In the right lung there was a purulent focus about the size of a cherry. The necessity of careful and repeated examinations, even when the symptoms are not suggestive, is very clearly shown by this experience. It is highly probable that the diagnosis of abscess could not have been made, even though homonymous hemianopsia, which must have been present, had been detected. The case further teaches that the pulmonary origin of cerebral abscess should be constantly kept in mind and carefully searched for. The same writer reports a second case, which is no less interesting. The patient, a woman, aged fifty years, had complained for two years of severe headache, which followed a fall on the back of the head. Two weeks later there was left hemiparesis, inclusive of the left angle of the mouth. She complained of a swishing, ticking sound in the right ear, of headache, which was more severe on the right side than on the left, and of occasional vomiting. The top of the head, the back of the neck, and the spinous processes of the interscapular space were sensitive to pressure. A diagnosis of brain abscess in the vicinity of the internal capsule plus superimposed hysteria was made, although on what grounds is not apparent from the history. The patient improved rapidly. Three months later she was readmitted to the hospital on account of fracture of the thigh. A fortnight after this there were severe headache and vomiting. The left upper extremity was in a condition of flexion-contracture. The patient got steadily worse, and died in a condition of stupor two months after readmission. Double optic neuritis was made out some time before death. There was no fever, but during the last days the pulse was very rapid. An autopsy revealed a large, pasty, broken-down mass in the posterior third of the right hemisphere, in the centre of which was a round, brownish-red conglomeration, containing pus. A third case reported by this writer is that of a man, aged thirty-two years, who had complained for about six weeks of pain and difficulty of hearing in the left ear. There was no history of discharge from the ear. Paracentesis of the drum ameliorated the pain. A month later the patient complained of severe right-side headache, followed by dizziness, vomiting, and progressive mental obscuration. Lumbar puncture was made, but without result. Two weeks later there were nystagmus, left convergent strabismus, unequal pupils, the left being larger than the right, and left hemiparesis. A fortnight later the patient died suddenly.

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[1] Neurologisches Centralblatt, 1898, p. 768.

[2] Ibid., p. 1070.

Autopsy revealed an abscess involving the entire left cerebellar hemisphere, apparently secondary to thrombus in the left transverse sinus and a carious condition of the petrous portion of the left temporal bone. In this case the existence of abscess was apparently not suspected. It would seem from the history of middle-ear involvement and from the development and association of the symptoms that cerebellar implication could be the only hypothesis to explain the patient's condition. Considering the complications in this case, it is very difficult to say what the outcome would have been, even though operation had been undertaken early, but this is a type of case in which surgical exploration is not only justified but demanded.

Von Celli[1] has reported a case of brain abscess in which otitis media attended by spontaneous perforation followed an attack of influenza. The patient had symptoms of a mild infection without particular nervous phenomena. Death occurred suddenly, without apparent cause. The autopsy showed active suppuration in the mastoid cells; intimate adhesion of the membranes over the temporal lobe to the petrous portion of the temporal bone, and a full abscess in the inferior temporal gyrus. Although very incompletely reported, this case may be utilized to show that the symptoms of cerebral abscess are sometimes so inconspicuous that the existence of the disease can only be guessed at from the association of apparently trivial symptoms with suppuration of the middle ear. Recitation of it emphasizes the necessity of treating inflammations of the middle ear following such a simple disease as influenza with the same care and determination bestowed on far graver conditions. In the same *Bulletin* (page 450) Balliet records an example of abscess of the cerebellum consecutive to suppuration of the middle ear, occurring in a man aged thirty-six years. The symptoms suggested abscess of the cerebellum, and operation was undertaken to reach it, but with negative results. On autopsy it was found that the abscess occupied the entire central portion of the left cerebellar hemisphere. The abscess-cavity was not found, because the trephine opening was not large enough to allow sufficient exploration, which may be taken to show that when the symptoms of abscess are so pathognomonic as they were in this case no limit should be put upon the amount of exploration necessary to its discovery. Operation is the patient's only hope, and the fact that the abscess is not discovered by one trephine opening should not be taken to indicate that several others or even extensive resection of the skull-cap should not be made.

Balas and Cade[2] have reported a case of abscess of the brain with phlebitis of the right lateral sinus of otitic origin, which may be taken as a type of the case that should at the present day be amenable to

[1] Bulletin de la Société Anatom. de Paris, 1897, p. 333.

[2] Lyon Médical, March 20, 1898.

surgery. The patient developed, after an acute purulent otitis media, mastoid pain followed by grave cerebral phenomena indicative of intracranial inflammation. The mastoid was opened, but without amelioration of the symptoms. Two days later a trephine opening was made over the temporal lobe, but without immediate results. Three days afterward there was an issue of pus through this opening, followed by temporary amelioration of the symptoms. The report of the case does not show why the trephine opening was not enlarged at this time and the brain substance incised until the pus-cavity was reached. The patient died a few days later, and on autopsy an abscess was found just below the level of the trephine opening.

McKernon[1] reports a series of three cases of intracranial abscess, two of which are of interest in this connection.

A girl, aged seventeen years, had suffered for eleven years with intermittent discharge from both ears, and for four years with violent occipital headaches. Just previous to coming under observation the discharge and headache had become more severe. Temperature and pulse were somewhat elevated. There was absence of the right drum membrane except a small portion in the posterior superior quadrant, which was bulging. There was a large amount of granulation tissue, covered with gray-colored muco-pus. The upper third of the right mastoid was slightly tender. The patient continued to grow worse. Operation: Opening the mastoid revealed nothing abnormal save the remains of a condensing mastoiditis and a few drops of pus in the antrum. After the operation the patient complained of unbearable headache, restlessness, and sleeplessness. The temperature ranged from 99° F. to 102° F. There was no optic neuritis. A second operation was done and the sinus curetted. During the operation it was noted that the posterior dural wall of the lower half of the sinus was thickened and slightly bulging. The next day the dura over this point was opened and a grooved director introduced downward and backward for about two inches. On withdrawing it there was a discharge of an ounce of foul-smelling pus. When the opening was enlarged more pus discharged. The patient died a few hours after the last operation. In this case the existence of abscess of the brain was probably not suspected, it being come upon accidentally, for otherwise a different route would have been taken to reach it.

A second case reported by this writer was that of a young man who had had for some years intermittent discharge from the ears, usually associated with attacks of pain. Two weeks before admission to the hospital one of these attacks had occurred. The pain ceased, when a thin, white discharge made its appearance. The discharge stopped after a few days, and the pain recurred with renewed violence. The pain continued to grow worse, and on examination there was found a scanty discharge of gray pus from the right ear and a greenish discharge from the left ear. No mastoid tenderness. Examination of the urine showed that the patient was suffering from nephritis. When the mastoid was opened it was seen that the cells were all broken down, pus flowing freely from one to the other. The cavity was scraped and packed. The next day the patient continued to complain of violent pain in the wound and in the back of the head. The lateral sinus was exposed and opened from end to end, and a quantity of pus, clotted blood, and granulation tissue evacuated. The dura of the posterior sinal wall remaining tense, an opening was made through it, and a director carried into the cerebellum. When it was withdrawn there was an oozing of foul-smelling pus. The opening was then enlarged with the finger, and about two ounces of pus escaped. The next day he died of uræmic coma. The outlook in this case would seem to have been favorable, despite the extensiveness of the suppurative process, had it not been for the existence of a condition that is extremely intolerant of the depreciation of vitality attending surgical operation of any kind.

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[1] Archives o Otology, 1898, vol. xxvii. No. 3.

Marie and Sainton[1] have recorded a case of abscess of the left temporal lobe. In addition to being an important contribution to the study of aphasia, the history and outcome of the case show the urgent necessity for early and extensive surgical interference. The patient was a man, aged forty-seven years, whose first symptoms of cerebral abscess occurred in October, 1897. Although there had been no discharge from the ears, disease of the middle ear was found. The patient died four weeks after the first symptoms of cerebral abscess. The general symptoms and the aphasic symptoms pointed to abscess in the posterior portion of the supertemporal and midtemporal convolutions, cutting off the auditory from the visual centre. An operation was undertaken, but only a small opening was made and the abscess was not found. Examination after death revealed an encapsulated abscess the size of a small egg, situated in the position diagnosticated during life, and surrounded by a considerable area of non-purulent encephalitis. It was apparent that if the operation had been undertaken earlier and the surgeon had been fearless in the exploration the patient would have been saved. The authors, in concluding their paper, lay great stress upon these facts.

A case in which the outcome of operation was most satisfactory is recorded by Roper.[2] A boy, aged fourteen years, had had for upward of two years a discharge from the left ear. Latterly the discharge had become fetid, and the patient complained of severe pains in the left ear and side of the head. The pain seemed to be liable to paroxysmal increase, and after a few days it was attended with loss of memory for words, slow pulse, slight rise of temperature, vomiting, loss of power in the right arm, and double optic neuritis. There was no mastoid tenderness. The left temporosphenoidal region was explored and an abscess found. The arm recovered its power at once, showing that its impairment was dependent upon an œdematous condition of the motor area. The patient's memory gradually became restored, and eventually he made a complete recovery.

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[1] Revue Neurologique, 1898, p. 198.

[2] Lancet, February 26, 1898.

A case very similar to this except in its outcome is that reported by Paquet.[1] The patient was a child, aged five years, who developed slight œdema of the right side of the face and head, without apparent cause, save an otitis which was consecutive to an attack of measles three years before. Five days after swelling of the face the patient was taken with rigors, followed by headache and vomiting. The symptoms were thought to indicate mastoid involvement, and the mastoid was trephined, but without result. A few days later the patient died in coma. The autopsy revealed an abscess in the second right temporal convolution, which apparently was consecutive to thrombus of the lateral sinus. Why the lateral sinus was not explored when such positive indication of its infectious involvement occurred as in this case it is not easy to conjecture. When abscess of the brain is secondary to infection of a sinus it can scarcely be suspected even unless some area of the brain to which is allocated special function is involved. As the second temporal convolution of the right side is a "silent" area, no symptoms were present in this case.

Dench[2] records a case of temporosphenoidal abscess sequential to chronic purulent otitis. The patient had complained of intense headache, especially of the left temporal region. Just before coming under observation the pain was very severe. Apparently abscess of the brain was not suspected, for the mastoid antrum was opened and a considerable amount of cholesteatomatous material removed from the tympanic vault. Twenty-four hours after the operation symptoms of aphasia appeared. The middle cranial fossa was then opened just above the external auditory canal, the meninges reflected, and the temporal lobe explored by an aspirating needle. Pus and broken-down tissue having been found, the temporal lobe was freely incised. This revealed a large abscess-cavity, which was drained. The patient died four days later from suppurating meningitis, which was well developed before the second operation was undertaken.

It is not at all improbable that if operation had been undertaken before secondary infection of the meninges the outcome would have been different. The abscess-cavity was so completely emptied and drained that there would seem to have been no reason why the patient should not have recovered.

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[1] Le Nord Médical, April 1, 1898.

[2] Transactions American Otological Society, 1898.

Holt[1] has reported five cases of abscess of the brain in infants, and published a summary of twenty-seven cases in infants and very young children. He calls attention to the fact that abscess of the brain is rare in children under five years, and emphasizes the remarkability of this, considering that the two most potent causes of abscess—traumatism and otitis—are both very frequent during the first five years of life. The explanation of the apparent discrepancy between cause and effect is no doubt to be found in the fact that (1) although middle-ear disease is common before the fifth year, it is not frequently met with in young infants, and the time elapsing between its occurrence and the appearance of brain abscess is so protracted that it brings the patient beyond the fifth year; and (2) many cases of brain abscess occurring before the fifth year are not recognized. In young children the symptoms are much less pathognomonic. Unfortunately, they are at all times rather obscure, the patient not having the understanding to make complaint of pain and its character, and they are often mustered under the diagnosis of "meningitis" or "brain fever." Moreover, Holt's search of the literature is not complete, for I have found, without particular investigation, the report of a case by Ribbert[2] of a twelve-day old child in which autopsy revealed that both hemispheres were percolated with small abscesses. This writer refers also to a case reported by Zenkner and Wagner. It may therefore be said that, although abscess of the brain is more uncommon before the fifth year than during the latter half of the first decennium, it is not so uncommon as might be inferred from an examination of some of the older writers quoted by Holt, such as Meyer and Wyss. In the first case reported by Holt—a child, six weeks old—neither the history nor the symptoms suggested abscess of the left parietal lobe, which was revealed by post-mortem examination. Although there had been no discharge from the ears, thin, yellowish pus was found in both middle ears after death, so it seems probable that the brain was infected from the ears. The second case—a child, three months old—had symptoms such as constant fever (which during the last week was high); irregularity of respiration, cervical opisthotonos, and transient slight manifestations of nystagmus, rigidity, retraction of the abdomen, and vomiting, which led to the diagnosis of an irregular type of meningitis. Autopsy showed an abscess-cavity of the right parietal lobe, communicating freely with the right lateral ventricles. Both lateral ventricles, as well as the third and fourth, were filled with pus. The inferior surface of the cerebellum was softened and infiltrated with pus. Pus was found in the left internal auditory canal. The third patient was a child of five months, in which superficial abscess of the cerebellum was associated with diffuse purulent meningitis. Three days after a fall on the head the child began to emit piercing shrieks and to vomit. He lost flesh steadily, and had frequent attacks of muscular twitching, but no convulsions. The temperature was continually elevated, the pulse small and feeble; the neck retracted; there seemed to be no vision. The fourth patient was a child nine months old, whose symptoms seemed to be alternating psychical and motor irritability, drowsiness, cervical opisthotonos, tense bulging fontanelle, dilatation of the pupils, irregular respiration and temperature, a discharging right ear, rigidity of the four extremities, marked vasomotor symptoms, and optic-nerve atrophy. The case was regarded as one of basilar tumor or tuberculous meningitis. Autopsy showed one large and two small abscesses of the cerebellum. The fifth case can scarcely be called one of abscess, as the lesion was a suppurative ependymitis, acute pyocephalus.

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[1] Archives of Pediatrics, 1898.

[2] Berliner klinische Wochenschrift, 1879, p. 617.

Other cases of abscess of the brain, to which particular reference will not be made, have been recorded during the year by Grunert,[1] Poli,[2] Thomas and Lartail,[3] and by Vernazza.[4]

Thus it will be seen that a brief retrospect of the more important literature on brain abscess for the past year shows a deplorable mortality. The most potent factor in contributing to this frightful mortality is the failure to recognize the existence of abscess of the brain before it has produced either septic complications or profound exhaustion. Surgical technic has apparently very little, if anything, to do with it. The mortality-rate of brain abscess will drop just in proportion to the earliness of recognition and the courage of the physican in directing the surgeon to seek for it, even though there be no exact localizing symptoms. Abscess of the brain secondary to middle-ear disease is located in the vast majority of cases either in the temporal lobe or in the cerebellar hemisphere of the same side. When one is reasonably sure of the existence of brain abscess, no hesitation should be had in exploring first one of these regions, and then, if it is not found, the other. Delaying the operation until the appearance of unequivocal localizing symptoms, or procrastinating by operating on the mastoid after symptoms of brain abscess are evident, when one is reasonably assured that abscess exists, is a far greater injustice to the patient than subjecting him to an exploratory trephining.

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[1] Münchener med. Wochenschrift, 1898, p. 245.

[2] Arch. it. d'Otol., Rinol. e Laringologia, vol. vii. fasc. 1. January, 1898. La Clinica Medica Italiana, July, 1898.

[3] Rev. hebd. de Laryng., Otol. et Rhin., February 26, 1898.

[4] Boll. delle mal. dell' orech. della gola e del naso. 8, 1898.

REVIEWS.

A System of Medicine by Many Writers. Edited by Thomas Clifford Allbutt, M.A., M.D., LL.D., F.R.C.P., F.R.S., F.L.S., F.S.A.; Regius Professor of Physic in the University of Cambridge; Fellow of Gonville and Caius College. Vol. vi. London and New York: The Macmillan Company, 1898.

A review of the parts of such a comprehensive work as that of which this forms the sixth volume is difficult from the fact that so much is to be said that any article that would represent the contents at all adequately could not be condensed within the limits of the ordinary Journal review. It is only possible, therefore, to call attention to certain scattered points. The present volume contains articles upon the diseases of the respiratory system, some of the articles upon the cardio-vascular system, and the diseases of the blood. It differs from the ordinary arrangement of such works, partly from the placing of the blood diseases under the heading of the circulatory system, partly also from the interposition of three important and very valuable articles upon intrapleural tension, cardiac physics, and dropsy. The advantage of the former feature seems to the reviewer to be very doubtful. As an argument against such an arrangement may be mentioned the fact that scurvy is properly considered in close connection with the purpuras and with hæmophilia, yet scurvy cannot be considered a disease purely of the circulatory system, or even of the blood, to any greater extent than could rhachitis or gout. However, this is but a small question, and the matter in the articles is good, no matter where they be placed.

As with previous volumes, much value is added by the carefully selected and arranged bibliography at the end of each article. Moreover, the references are made much more useful by the sensible alphabetical arrangement according to the author's names, making the finding of the reference an easy matter, instead of a labor in itself, as is the case in one of our best encyclopædic works of reference, where, for no obvious reason, the enumeration of authorities is made in such a higgledy-piggledy manner that often the whole and unnecessarily long list of references has to be scanned in order to find the one desired.

The first two articles are by William Ewart, and deal with diseases of the bronchi. The classification of the various forms of bronchitis is the one that is of most clinical value. With others, he believes it difficult to draw a hard-and-fast line between capillary bronchitis and broncho-pneumonia, but gives it as his opinion that the former term should be retained. He says that while the casts of plastic bronchitis may consist largely of mucus, they are "mainly fibrinous, and owe to fibrin their characteristic consistence." This is opposed to recent views as to the formation of these casts, as especially studied by Grandy (*Centralblatt f. allgem. Path.*, viii. 13) and Habel (*Centralblatt f. innere*

Med, 1898, No. 1, p. 9.). In the matter of treatment of the various forms of bronchitis the author has a decided leaning toward the theoretically plausible method of intratracheal injections. It is a decided comfort to find so high an authority advocating the use of the much maligned poultice. The subject of bronchiectasis is thoroughly discussed, and an excellent summary of the various conflicting theories as to its physical causation is given, with a clear statement of the author's well-known view.

The important section upon pneumonia (croupous, catarrhal, and chronic) is written by P. H. Pye-Smith. A few points only can be touched upon in this review. The much-disputed origin of the crepitant râle is held to be the bubbling of air through moisture in the bronchioles. The occasional occurrence of a tympanitic or even cracked-pot sound, and of signs approaching those of pleural effusion, is mentioned, although these misleading sounds are but infrequently spoken of by writers on pneumonia. Nothing is said regarding the prognostic value of the presence or absence of leucocytosis, the statement being made, without qualification (p. 112), that the leucocytes are considerably increased. In regard to the nature of pneumonia, he concludes that the disease is due to a special form of inflammation of the lung, and differs in important particulars from the ordinary specific fevers. In thus stating his views the author takes a position opposed to that of many systematic writers, yet a careful reading of the section on the pathology of the disease (on page 114) cannot fail to impress all. It is disappointing, however, to find no explanation for the curious, sudden cessation of symptoms at the time of crisis, and to find no remarks upon the powerful effect of the toxins of the disease. While much of this question of toxin and antitoxin formation in pneumonia is as yet purely theoretical, it would have been of interest to read the author's views upon it. One other point that is noticeable is the absence of mention of so-called meningismus, which, at least in children, is so frequent a source of error in diagnosis. The value of digitalis in the treatment of pneumonia is held to be *nil* in his experience. However, to appreciate the author's view regarding digitalis the original should be read. Venesection in cases of overdistention of the right heart is urged as rational and useful. Appended to the section on croupous pneumonia there is an analysis of 434 cases of acute fibrinous pneumonia from private and hospital records.

Dr. Percy Kidd has written the article upon phthisis pulmonalis. Of the many striking features of this article but few can be selected for comment. In discussing diagnosis he makes the statement that the cracked-pot sound is not pathognomonic of cavity, as it may be obtained on percussing the normal chest of a crying child. The truth of this must be recognized by anyone accustomed to examining children, yet one seldom sees reference to its presence in those circumstances. One is surprised to find no mention of Eustace Smith's sign of enlarged tracheo-bronchial glands, although other evidences of that condition are fully discussed. The proportion of cases of phthisis wherein pneumothorax was found at autopsy (11 per cent.) seems very large. In speaking of the treatment of hæmoptysis he says, most truly: "Clinical experience shows that the effect of ergot is as uncertain and unsatisfactory as those of gallic acid and lead," and also that the application of ice to the chest is of but little use.

The article upon pneumoconiosis contains two sentences that mar an otherwise good article. It is stated that "when dust which has entered the respiratory system has reached the alveoli it attaches itself in the first place to the walls, but sooner or later penetrates them. The particles are borne along by mucous cells, which, being destitute of walls, envelop them after the fashion of amœbæ; but the foreign bodies soon prove a source of irritation, which in the case of the more irritant kind advances to inflammation of lower intensity, but sufficient to induce an outpour of some lymph and the generation of granular matter and exudation cells," and, there might then have been added, "and they all fell to playing catch as catch can till the gunpowder ran out of the heels of their boots." The "mucous cells" again get lost in the next sentence, for we read that "the mucous and inflammatory cells make their way along the adjoining connective tissue," etc.

Pulmonary aspergillosis is well discussed by H. D. Rolleston in an excellent review of our present scanty knowledge of the condition.

In the article upon emphysema, by J. R. Fowler, the subject is divided into two sections, dealing with large-lunged and small-lunged varieties—a division that has decided value on both clinical and pathological grounds. As in the article dealing with pneumonia the deceptive atypical physical signs are mentioned, so in the article upon pleurisy, by Dr. Samuel Gee, the occasional occurrence of bronchial breathing over pleural effusion is noted at some length. The various explanations of the presence of bronchial breathing over some pleural effusions are all unsatisfactory, Dr. Gee's explanation being that the transmission of the breath-sounds from the bronchi "depends not inversely upon the quantity of liquid effused, but directly upon the openness of the air-tubes; for liquid is a good conductor of sound." It seems to the reviewer that this explanation does not explain, and that the transmission of various sounds depends not so much upon the conductivity of the various media as upon the relation of the latter to each other and the various sound refractions (so to speak) that occur upon the transmission of vibrations from one medium to another. With the statement that ægophony is seldom heard there can be nothing but agreement, and it is often noticed with what disappointment the student hears that ægophony—one of the sounds that he seems always to expect to find—is absent in the vast majority of cases of pleurisy with effusion. In the section on treatment no mention is made of the value of sodium salicylate or of Hay's treatment—measures that surely deserve a place.

An excellent and appropriate article by Professor Michael Foster upon the general features of the blood deserves notice. It is, indeed, a valuable feature of the volume, being more physiological than the usual clinical article and more clinical than that found in works upon physiology.

Dr. S. Monckton Copeman has written a good article upon the clinical examination of the blood. His classification of the leucocytes is as follows:

- (*a*) Oxyphil
  - coarsely granular.
  - finely granular.
- (*b*) Basophil
  - coarsely granular.
  - finely granular.
- (*c*) Hyaline
  - large.
  - small.

It is, indeed, a pity that some uniform system of classification of the leucocytes cannot be agreed upon. Some simple and yet clinically expressive nomenclature is certainly desirable. It can hardly be granted that the above classification is entirely satisfactory.

In speaking of the estimation of hæmoglobin the apparatus of Dr. Oliver is recommended. The most serious fault in v. Fleischl's apparatus and the method of correcting it is not mentioned—the wide difference (10 per cent.) in the readings at the two sides of the reservoir, which can be obviated by interposing a paper in which a slit has been cut, which cuts off all light transmission except for a space corresponding to two or three degrees.

The article upon cardiac physics, by Professor Sherrington, is well worthy of careful reading. Its introduction into the volume is a decided gain. It is very satisfactory to find that the author considers cardiograms inconclusive. An intimate acquaintance with the cardiograph would seem to be necessary ere one could learn anything from its tracings or could properly weigh the conflicting interpretations of the integral parts of their frantic curves. Such an amount of experience with the instrument is not usually attained by the ordinary clinician.

An excellent introductory article upon the classification of the anæmias and one upon chlorosis are written by the editor. The various theories upon the causation of the latter receive careful attention, and are clearly expounded, while the clinical picture of the disease is delightfully portrayed. Pernicious anæmia is described by Dr. Sidney Coupland. He gives his adherence to the hæmolytic theory of its causation, as elaborated by Hunter.

The articles upon splenic anæmia, hæmophilia, hemorrhages in newborn children, purpura, scurvy, and hæmoglobinuria are all excellent.

Dr. Robert Muir's article upon leucocythæmia is extremely satisfactory. In regard to its causation he says: "In the absence of knowledge regarding the agent producing the excessive proliferation of leucocytes we cannot definitely assign the place of leucocythæmia in the category of disease. On the whole, it presents most points of analogy to the growth of tumors, the analogy being especially striking in the lymphatic variety; but, on the other hand, it is not absurd to suppose that it may prove to be due to a microparasite." Such a thought must have struck any one familiar with either the clinical or pathological aspects of the disease. The solution of the question must reasonably be expected to be forthcoming at some not far distant time, especially with accumulating experience of the acute forms.

Articles dealing with symptoms common to many diseases are shown to be of value by two in this volume. One of these is that upon purpura, by Stephen Mackenzie, the other, that upon dropsy, by W. Howship Dickinson. In both of these articles the subjects are excellently handled without duplicating the matter contained in the various sections dealing with the diseases of which they are but symptoms.

The remainder of the volume is concerned with a part of the subject of diseases of the heart. These require but little notice, as the names of the authors carry with them the assurance that their work results in articles destined to be classics. The article upon functional disorders of the heart, by the editor, should be read by every one, not only because of the useful, practical matter contained in it, but as a type of clearly written English seldom found in medical writings.

The volume that forms the subject of this review bears out the promise of its predecessors, that the *System of Medicine by Many Authors* will rank with Ziemssen's, Reynolds', and Nothnagel's encyclopædic systems as standard works of reference for very many years. F. A. P.

RENAL GROWTHS: THEIR PATHOLOGY, DIAGNOSIS, AND TREATMENT. By T. N. KELYNACK, M.D. (Vict.), M.R.C.P. (Lond.). Edinburgh and London: Young J. Pentland. New York: The Macmillan Company.

THE fact that no systematic treatise on growths of the kidney was to be found in the English language caused Kelynack to attempt to supply what he justly calls "a want." The author calls attention to the uncertainty and confusion of our knowledge regarding kidney growths, to the obscurity of their pathology, and to the scant attention given to the origin, character, and relationship of renal neoplasms, a custom which until very recently was the fixed habit of writers, observers, and teachers.

It is quite true that numerous cases have been put on record, but many of the reports are almost or quite valueless because of a hap-hazard, improper, and confused nomenclature. Some of the descriptions are entirely misleading, and there has been an accumulation of what Junius called "false facts." Most growths, says Kelynack, have not been molested, but have been allowed to run their course, because surgery in the past has not been very successful. It is obviously urgently necessary to have a scientific basis for practice—"clinical progress halts for an advance in pathology." This book seeks to furnish, and does furnish, a greatly needed advance in pathology, and we find in it a study and comparison of all recorded cases, the erroneous and misleading reports being pointed out and the reliable ones being indicated and analyzed. The author draws many valuable clinical deductions from pathological observations, and essays to place the treatment on a scientific basis. The book contains numerous excellent cuts and also a most thorough and valuable bibliography.

The commonly accepted nomenclature of renal growths is, with justice, strongly condemned by the author. He shows that almost inextricable confusion has arisen from "the use and misuse of terms." Most malignant tumors have been called "cancers," many have been designated "encephaloid growths;" others have been recorded as instances of "fungus hæmatoides." In a majority of the older cases no microscopic study was made. Reports are reliable only when founded on a microscopic study, and "it is only within the last few years that renal carcinomata and sarcomata have been differentiated." In many reports there is no distinction made between primary and secondary growths.

Kelynack protests against a not unusual custom of placing enlargements of the kidney due to inflammation or a mechanical condition in the same class as renal growths. He uses the word tumor as rarely as possible, but he considers the term of service if we wish to designate an enlargement of the kidney irrespective of the pathological cause. The term growth always means a true neoplasm.

The author recognizes the desirability of making a classification of growths based on pathological characteristics, but realizes that at the present time it is "most scientific and serviceable" to group neoplasms according to histological characters. A perfect classification is not now possible, but "as a means to a more desirable end" a division should be made which is similar to or identical with the classification of tumors recommended by the Royal College of Physicians in 1896.

In the chapter on the frequency of renal growths we note that less than 0.19 per cent. of all deaths are due to primary growths—sarcoma is much commoner than carcinoma; secondary growths are rarely large, are often bilateral, and do not frequently cause kidney symptoms unless there is direct infiltration. Primary growths usually become large, and generally remain unilateral.

In discussing causation the author maintains that it is impossible to explain the presence of certain elements in some growths without invoking as an explanation the inclusion theory of Cohnheim. Some sarcomata develop during fœtal life, and Kelynack believes that such facts give probability to the view that embryonic inclusions existed. Such inclusions may become active during fœtal life, or may remain dormant for months or years, to become active, it may be, at a later period.

The author attaches only slight importance to the causative influence of heredity, and but little to trauma. In some cases trauma first directs attention to an organ already diseased; but there can be little doubt, says Kelynack, that the persistent irritation produced by calculi may lead to morbid growths in the renal pelvis or even in the parenchyma. The fact that malignant disease is more common in the young is proved by the following statement: Out of 160 cases of malignant disease, 84 cases, or over 52 per cent., were under ten years of age, and 74 of these were under five years of age. Malignant growths at this early age are sarcomatous. Carcinomata never arise in children, and are most common between forty and sixty years of age. Malignant cyst-adenoma may occur at an earlier age than does cancer.

The author says that renal growths usually attain a size which permits of palpation, and may even become enormous (thirty pounds in children, forty pounds in adults); but renal tumors which were too small to be palpated have caused death by hemorrhage.

The shape of the tumor is usually, but not always, reniform, "without irregularities and notches," but frequently the shape of the mass does not resemble the kidney, and irregularities and nodules may be felt.

A malignant tumor, we read, is disseminated chiefly by the veins. Dissemination by the lymphatic system is rare and never early. If lymphatic dissemination does occur, the adjacent glands become involved, but the retroperitoneal and more distant glands are not often affected. The glands most apt to suffer are those at the hilum, but the vertebral, mesenteric, cervical, or axillary glands may become diseased. It is very important to remember that, as a rule, a malignant tumor remains local for a considerable time after it begins to form. The author discusses in detail benign tumors (fibroma, lipoma, myxoma, chondroma, osteoma, angeioma, lymphangioma, and lymphadenoma); adrenal growths, adenoma, malignant cystadenoma, sarcoma, carcinoma, and perirenal growths. In discussing the symptomatology he emphasizes the following facts:

There is rarely bulging in the lumbar region, but is usually some increase of resistance. The mass is never notched, is usually smooth, and if the entire kidney is involved is reniform in outline. If only a part of the organ is involved, as in adenoma, the outline is not reniform. The bowel is usually in front of the mass; but if the right kidney is involved, the cæcum and colon may be pushed to the inner side, and if the left kidney is affected the colon may be pressed outward. A mobile kidney may float forward in front of the colon or small intestine. The statement made by Musser, that "renal growths are always immovable, either by the hands or with respiration," is not correct; they are often distinctly, but slightly, movable. Guyon pointed out ten or twelve years ago that the kidney moves with respiration, and the reviewer, in common with many surgeons, has observed this fact. Before adhesions form ballottement can usually be obtained. Hemorrhage is an early symptom in 50 per cent. of cases, and hæmaturia without nephritis or cystitis always suggests tumor. Hæmaturia is more common in adults than in children. It may be an early symptom or even the first symptom. It may be late. It may be intermittent or persistent. It may occur but once or twice; it may be frequent. Bleeding is usually slight, but may be copious and even fatal. Marked hæmaturia is never caused by innocent growths. Pain is rarely of much value as a symptom. In some cases it is the first symptom, but it is often entirely absent until adhesions form. Symptomatic varicocele may occur. Uræmia is rare, but will probably arise if nephritis attacks the sound kidney. Pressure symptoms depend on the size of the tumor. The examination of the urine is often of little value, but if considered with the symptoms may be useful. Blood may be found. Albumin is rare if blood is absent. Pus will be found if there are calculi or suppurative conditions in the renal pelvis. Acetone is present in advanced cases. Characteristic cells are rarely found, but occasionally fragments of sarcoma can be detected. Epithelium and casts are often met with. The author is evidently not a believer in Rommelaere's alleged pathognomonic sign of cancer, as he does not refer to it. This sign is a diminution in the normal amount of NaP_2O_5 and NaCl. Cazin believes it simply points to cachexia.

In discussing diagnosis we believe the author should dwell more on the importance of obtaining the separate urine from each kidney when there is hæmaturia but no positive sign as to which kidney is diseased. The proper use of this method will lead to earlier operation in many cases.

Kelynack is a strong believer in total nephrectomy performed as early as possible. He places the mortality at about 50 per cent. We think this estimate somewhat high. Rovsing points out that recent operations show a much lower mortality than was formerly the case. He says that during eighteen years total nephrectomy has been performed 150 times for malignant disease. Before 1890 the mortality was between 50 and 66 per cent. Since 1890 the mortality has been between 20 and 25 per cent., the improved results being due to earlier operation. Partial nephrectomy, as proposed by Tuffier, for innocent growths is barely mentioned.

This book contains a great amount of very valuable information, and it should be read by all surgeons and physicians. The pathological observations are excellent. The original studies have been most carefully made, and all articles and reported cases have been found and considered. We would not be willing that our library should be without it, but believe it would be made even more valuable by going more into detail in the chapters on Diagnosis and Symptoms and by having a surgeon write a comprehensive chapter upon the operative problems involved.

J. C. DA C.

THE ESSENTIALS OF HISTOLOGY, DESCRIPTIVE AND PRACTICAL, FOR THE USE OF STUDENTS. By E. A. SCHÄFER, LL.D., F.R.S., Jodrell Professor of Physiology in University College, London; Editor of the Histological Portion of Quain's *Anatomy.* New (fifth) edition, revised and enlarged, with 392 illustrations. Pp. 359. Philadelphia and New York: Lea Brothers & Co., 1898.

THIS admirable text-book, so well adapted to the needs of the student in the laboratory, is too well known and appreciated to require very extensive mention. The present does not depart greatly in arrangement and contents from previous editions; some additions have been made to the text and to the number of illustrations.

The book presents a rare combination of brevity and completeness, the illustrations are apt and abundant, but should be used in connection with the actual specimens, for they are often too idealistic and diagrammatic to convey to the inexperienced student a true idea of what he should expect to see under the microscope.

The purpose of the book we take to be rather that of an introduction to the study of histology than of supplying a text-book of microscopic anatomy. Accordingly, about one-third of the volume is devoted to the important subject of the elementary tissues and cytological structures, and especial attention is given to the difficult study of fresh tissues and their behavior to the reagents. The student who conscientiously follows the lines laid down should become an adept in the use of the microscope and of reagents. The methods of preparing tissues are briefly but sufficiently described, and are, it is needless to say, reliable.

Embryology is dealt with only in so far as it is of importance in a proper comprehension of histology, which is rather an advantage than otherwise in a work of this character. The general tone is clear and concise. Little space is given to mooted questions, such as the minute structure of striped muscle, and they are discussed in the light of Professor Schäfer's own views.

C. A. H.

A TEXT-BOOK UPON THE PATHOGENIC BACTERIA, FOR STUDENTS OF MEDICINE AND PHYSICIANS. By JOSEPH MCFARLAND, M.D. With 134 illustrations. Second edition, revised and enlarged. Philadelphia: W. B. Saunders, 1898.

IT was in 1849, just fifty years ago, that Pollender first saw bacteria in the blood of animals suffering from anthrax. Men are living and practising to-day who began their professional career before Pollender's discovery. It is almost stupefying to contemplate the advances they have been enabled to witness in that brief period of time. Bacteriology has been one of the main factors in the great advance of medicine. From small beginnings, ridiculed and denounced, it has grown until it has become one of the most important branches of science, one to which we owe the discovery of the causes of many diseases, and to which we may confidently look for light on numerous dark places in our knowledge. Sanitary science has been quickened by it, and many branches of industry have been completely revolutionized. For the physician a knowledge of bacteriology is now almost as important as a knowledge of the urine. It is only necessary to mention the value of sputum examination and of the study of purulent exudates; the indispensability of bacteriology in the diagnosis and treatment of diphtheria, and the latest application of the science to the diagnosis of typhoid fever, Malta fever, etc. Whatever weapons the medicines of the future will possess against the infectious diseases it is most likely to receive from the hand of bacteriology. The literature of the science is enormous, and modern text-books are plentiful—our own countrymen have produced several of recognized value. The one before us is now in its second edition, and is a very satisfactory presentation of a limited part of the subject, that part, however, which is of the greatest practical importance, namely, the disease-producing bacteria. The book is divided into two sections—in the first, the author considers the biology of bacteria, immunity, sterilization, and disinfection, cultivation, and the bacterial examination of air, water, and soil. Part II. deals with the diseases produced by bacteria. A classification of these diseases is attempted, but cannot be called entirely satisfactory. Under present conditions it is, perhaps, wisest not to draw sharp dividing lines between toxic and inflammatory, or, as the author calls them, phlogistic diseases, or these and septic diseases. Some of the inflammatory affections are certainly toxic as well. The various diseases and their bacteria are discussed very fully and in a way that demonstrates the author's acquaintance with the literature. Malta fever and cerebro-spinal meningitis seem to have escaped mention. The living problems of bacteriology—immunity, antitoxins, etc.—are entertainingly considered. It might be well to include in future editions a brief chapter on the pathogenic yeasts.

The diction is superior to that commonly met in medical text-books.

The illustrations are numerous, and typographically the book is very attractive. D. R.

DISEASES OF THE EYE: A HANDBOOK OF OPHTHALMIC PRACTICE FOR STUDENTS AND PRACTITIONERS. By G. E. DE SCHWEINITZ, A.M., M.D., with 255 illustrations and 2 chromo-lithographic plates. Third edition, thoroughly revised. Philadelphia: W. B. Saunders.

IN presenting the third edition of this excellent text-book the author states in his preface that "particular attention has been given to the important relations which micro-organisms bear to many ocular disorders." The frequent references which are encountered in the text show that the author has kept himself well informed, and has utilized to the best purpose the rapid progress of ophthalmology. The work will undoubtedly continue to be one of the most popular text-books on diseases of the eye for both students and practitoners. W. C. P.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Cardiac Epilepsy.—HERMANN BEER (*Klin.-therap. Wochenschrift*, 1898, No. 37) reports the case of a woman, aged fifty years, who for twenty years had steadily increased in weight, and for more than seven years had dilatation and hypertrophy of the heart and emphysema, with frequent attacks of loss of compensation. The woman suddenly had a convulsion and became unconscious, with increased cyanosis, dilatation of the pupils, and loss of pupillary reaction, deep and infrequent breathing, small and infrequent pulse, and bloody saliva. Ten days later there was another convulsion preceded by an aura, and in the course of a month three more attacks; but under treatment with bromides there was apparent recovery. The author considers this a symptomatic epilepsy, of the kind described by Mahnert and others as cardiac. The present case differs from those previously reported in having neither arteriosclerosis nor valvular lesion associated with the hypertrophy and dilatation. The remarks of the author and his classification of epilepsies are interesting, but contain nothing new.

DR. A. SMITH (*Münchener med. Wochenschrift*, 1898, No. 43) calls attention to cardiac epilepsy in the dilatation (formerly called idiopathic) of chronic alcoholism, and summarizes his experience as follows: 1. Under diseases claimed to be epileptic there is a large group in which neurotic predisposition and cardiac dilatation can be assumed to be associated, for the following reasons: The cardiac change can be demonstrated in the beginning, before epileptic symptoms appear. The latter then become more and more pronounced, and disappear with the improvement and recovery of the heart disease. 2. The dilatation is of alcoholic origin, as experiments show; it disappears, sometimes completely, with the cessation of the use of alcohol, but sometimes recurs at regular intervals for a time. In the former group a slight excess can bring on an attack, in the second group the fits are not so readily brought on, but in the periodic dilatation alcohol is likely to bring on severe attacks. 3. Recovery is possible only after complete abstinence, but is accelerated by remedies that strengthen the heart muscles.

Hysterical Diaphragmatic Asthma.—E. BARTH (*Berliner klin. Wochenschrift*, 1898, Nos. 42 and 43) reports the case of a non-commissioned officer who suddenly became dyspnœic, and gradually grew worse, so that he was unable to remain on duty. There was no previous history of importance, except that about a year before the patient lost his voice for two weeks, apparently as the result of overuse in drilling. The patient was pale, but without cyanosis or œdema. The dyspnœa was very striking, being both inspiratory and expiratory, and with only five or six respirations per minute. The patient complained of shortness of breath and pain in the thorax and abdomen. The lungs were overdistended, but without ausculatory abnormalities. There was neither cough nor expectoration. The nose, pharynx, and larynx showed no alterations of importance. The pulse was small and weak, the heart-sounds weak and impure, and the case seemed at first one of cardiac asthma. It soon appeared that this view was not in accord with the absence of cyanosis, the freedom from anxiety, the activity of voluntary motion, and the relative absence of asthma when the patient thought himself not observed. At times the patient complained of "palpitation of the heart," but this proved to be a clonic spasm of the diaphragm, in which twenty to twenty-five contractions were followed by a pause, the whole attack sometimes lasting many hours. Along with this there were tonic and clonic spasms of the orbicularis oris and the sphincter of the eyelids. How long the condition had lasted before admission could not be learned, but after two weeks in the hospital it suddenly passed over into complete paralysis of the diaphragm. The lungs retracted to their normal volume; the heart-sounds became pure; the dyspnœa continued. Inspiration was forced, but expiration was easy, and gave the patient slight relief. Faradization of the phrenics and practice in voluntary respiration were soon followed by improvement, but the dyspnœic motions returned whenever the patient felt he was being observed. Finally, complete recovery was obtained, and in the four months since then there was no relapse. A résumé of the author's comments is hardly necessary. He quotes largely from the work of Wernicke on hysterical dyspnœa from faulty innervation of the phrenics (*Monatsschrift f. Psychiat. u. Neurologie*, 1898, p. 200). In accordance with the modern tendency in Germany, the attack is explained as possibly due to overexertion of the respiratory organs, and the overexertion of the adductors of the larynx in giving commands is suggested as the probable cause of the previous aphonia!

A Case of Cheiromegaly in Syringomyelia.—LUNZ (*Deutsche med. Wochenschrift*, 1898, No. 41) reports the following: A woman, aged thirty years, with a negative family history, began to have epileptic attacks at sixteen. Three years ago pains began in the right wrist and hand, shooting out to both sides. At the same time there were chilly sensations, and the patient frequently burnt her hand by trying to get it warm. About the same time the right hand began to increase in size. For a year there have been pains and a feeling of chilliness in the left arm, back, and breast. The right arm, hand, and fingers are now considerably larger in all parts than the left, the increase being partly due to the soft parts and partly to the bone, as confirmed by the X-rays. The tactile sensibility is normal, as is also the sense of position and pressure and the muscular sense, but there is complete analgesia and loss of temperature-sense (ice and 40° C. cannot be distinguished) in the neck, back of the head and shoulders, the back to the ninth dorsal vertebra, the chest to the lower end of the sternum, and both upper extremities. There is no paralysis in the arms, but the strength is reduced in both, especially the right. The reflexes are lowered in the upper extremities, the knee-jerk increased, especially the right. Faradic reaction of muscles and nerves is lowered in the upper extremities. The absence of muscular atrophy is interesting. The changes in the bone as observed by the X-rays are like those described by Schlesinger in acromegaly.

Melanoplakia of the Mucous Membrane of the Mouth and the Diagnosis of Addison's Disease.—FR. SCHULTZE (*Deutsche med. Wochenschrift*, 1898, No. 46) calls renewed attention to pigmentation of the mucous membrane of the mouth, occurring in certain chronic diseases, especially cancer of the stomach. Stomatitis, cirrhosis of the liver, and jaundice may also be followed by pigmentation in the mouth that may excite the suspicion of Addison's disease. He describes a case in which there were discolorations in the skin and blackish spots on the soft and hard palate and gums. There was ascites, with reddish-yellow fluid of specific gravity 1017 in the peritoneal fluid. The spleen was enlarged. Tuberculosis, cirrhosis of the liver, and Addison's disease seemed possible, yet the patient was observed for seventeen months without other signs of that affection. In another case there was an old history of biliary colic, later irregular and intermittent fever, with chills, and jaundice. The skin showed brownish or yellowish discolorations (not jaundice), and there were grayish-brown areas in the mouth, with atrophy of the mucous membrane in the pigmented parts. Dulness over the left apex, with moist râles, strengthened the suspicion of tuberculosis and Addison's disease. The patient gained in weight, but later had a recurrence of biliary colic. An operation revealed extensive adhesions around the gall-ducts and gallstones, with small foci of suppuration. The patient recovered, but later had tuberculous epididymitis and orchitis, for which he was successfully operated. The author also describes a case with the asthenic symptoms of Addison's disease, but without discoloration, in which the autopsy showed only gastro-intestinal atrophy. [That pigmentation of the mucous membrane of the mouth is not a certain sign of Addison's disease will hardly be denied. On the other hand, the chronic course and partial improvement in the cases cited do not exclude Addison's.—ED.]

The Dyspepsia in the Early Stage of Pulmonary Tuberculosis.—W. CRONER (*Deutsche med. Wochenschrift*, 1898, No. 48) has investigated this subject by examinations not only on persons with gastric symptoms, but also in those in whom accidental dyspepsia, as from fever and alcoholism, might be excluded. There was nothing characteristic about the symptoms of tuberculous dyspepsia—eructations, a feeling of pressure in the epigastrium, succussion above the umbilicus, and irregular defecation being the most common. Dilatation of the stomach was not demonstrable in any case, and gastroptosis was rare and never severe. In no case was the motor power notably lessened. The chemical results varied greatly. The total acidity varied from 21 to 80, in most cases was about normal, but more frequently below than above. In only five out of thirty-six cases was HCl absent. It was not possible to find any relation between the chemical conditions and the symptoms. The author discusses the various explanations of the gastric alterations found, such as fever, swallowed sputum, anæmia, chronic gastritis, etc., and comes to the conclusion that the alterations are functional. The variable reactions and the inconstancy of the symptoms point to the same thing. The author also refutes the idea that the gastric symptoms of early phthisis are due to overfeeding in any considerable proportion of cases.

Disease of the Pancreas in Hereditary Lues.—According to SCHLESINGER (*Virchow's Archiv*, Band cxliv., Heft 3, S. 501) syphilitic involvement of the pancreas is rare in acquired lues. But few are recorded in the literature. On the other hand, the pancreas is comparatively frequently involved in inherited lues in the new-born child and in infants. This fact was first emphasized by Birch-Hirschfeld in 1875. He found the pancreas more or less extensively involved in thirteen cases out of a total of twenty-three autopsies on fœtuses or infants with hereditary lues. Since 1875 no observer has found the pancreas diseased in such a large percentage of cases. Birch-Hirschfeld published a second series of cases in 1880, in which he found the pancreas involved twenty-nine times in a total of 124 cases. Since Birch-Hirschfeld's first publication there has been no accurate study of disease of the pancreas in hereditary lues, and, for this reason, Schlesinger undertook the study of the gland, paying special attention to the histological changes produced.

Schlesinger draws the following conclusions from his study:

1. In hereditary lues the pancreas is less frequently involved than the spleen, liver, bones, and lungs, but oftener than the thymus, heart, or intestine.
2. Contrary to the view formerly held that the pancreas became involved only in the later months of fœtal life, it may become diseased as early or as late in intra-uterine life as do the other organs.
3. There is no close relationship between syphilis of the pancreas and coexistent disease of other organs. In exceptional cases the duodenum is diseased, and then both the pancreas and liver are usually involved.
4. Macroscopically, the first change in the pancreas is its increase in consistence and then its increase in size. The gland may become cartilaginous in its hardness, the head becoming more extensively involved than the tail.
5. Adhesions between the gland and adjacent organs are common.
6. The lesion is a diffuse interstitial pancreatitis, involving first the interlobular, then the interacinous, and finally the intercellular connective tissue. This process may be so extensive as to destroy completely the glandular portion proper.
7. No degenerative changes accompany the atrophy.
8. The connective tissue proliferation nearly always commences about the bloodvessels, rarely about the excretory ducts.

9. Syphilitic gummata are rare in pancreas in hereditary lues of infants as compared with their frequency in acquired syphilis.

10. The large and small ducts rarely show proliferation of the connective tissue about them.

11. Of the vascular changes pericarditis and endarteritis of the interlobular vessels and destruction of the periacinous capillary network are the chief ones.

12. The intertubular collections of cells, which are more abuandant in children than in men, were not involved in the connective-tissue proliferation nor in the atrophy of the parenchyma.

The True Function of the Thymus.—J. Beard (*The Lancet*, January 21, 1899, p. 144) made an exhaustive study of the thymus gland, using the thymus of one of the vertebrates, Raia batis, the smooth skate. Since Kölliker discovered that the thymus originates in mammals from the epithelium of a gill-pouch, and since he stated the original epithelial cells gave rise to lymph cells or leucocytes, two views have been entertained regarding the function of the gland. Stieda and His maintain that the leucocytes which always form an integral part of the gland soon after its formation are not produced in the gland, but migrate thither, probably from the mesoblast. According to these observers Hassal's concentric corpuscles are supposed to be formed from the original epithelial cells, and the function of the gland is still absolutely unknown. Stieda and His made no attempt to associate the Hassal corpuscles with the origin of the leucocytes. Kölliker first discovered that for a relatively long period of fœtal development the blood contained only nucleated red corpuscles and no leucocytes whatever. H. E. Ziegler ventured the opinion that this condition persisted until some lymphoid organ developed.

In studying the thymus of the smooth skate in sections of embryos 17 to 22 mm., Beard was able to demonstrate quite easily the transformation of the epithelial cells of the thymus into leucocytes. A one-eighteenth Zeitz oil immersion lens was used. The first change in the epithelial cell is one in its protoplasm or cytoplasm. This becomes somewhat more refractive, and in favorable sections takes on a somewhat brownish tinge. At first no alteration can be noticed in the nucleus, which is oval as in the other epithelial cells. Then it becomes rounded, and gradually the whole cell acquires this shape. With this and the marked refractile nature of the protoplasm the cell, according to Beard, takes on the characters of a leucocyte. These leucocytes for a time remain within the mass of epithelial cells, and later can be seen to migrate one by one into the mesoblast and elsewhere. He states that these cells do not wander into the epithelium of the thymus, because until some are formed within the latter there is no source in the body whence they could be derived. In embryos 22 mm. in length a few leucocytes are found in the blood itself. Beard holds that the absence of leucocytes in the earliest period of embryonic blood in vertebrates persists until the first ones are formed within the thymus-epithelium, and from its epithelial cells. In embryos from 28 to 42 mm. long the formation and emigration of leucocytes from the thymus becomes very active, and at this time there is no part of the embryo, including the blood, that is not infiltrated with leucocytes. This happens before lymphoid structures are developed elsewhere within the body of the smooth skate. Beard, then, believes with Kölliker that the formation of leucocytes is a function of the thymus gland. As a result of his work, he thinks that he has definitely proved that not only does the thymus form leucocytes, but that it is the parent source of all the leucocytes of the body.

Treatment of Obesity with Thyroid Preparations.—EBSTEIN (*Deutsche med. Woch.*, 1899, No. 1, p. 1; No. 2, p. 23) reviews the history of the administration of thyroid preparations in the treatment of obesity, and credits Yorke-Davies with its introduction for this purpose. He refers to the popularity of the treatment in England, and the warning which Burroughs, Wellcome & Co., the manufacturers of the tablets, gave against the abuse of the treatment by the laity, when the administration of the drug is not supervised by a physician. Without such supervision the possibility of thyroidism and other dangers is considerable. The treatment was advocated in Germany first by Leichtenstern and Wendelstadt, who claimed excellent results for it.

Ebstein declares strongly against the thyroid treatment of obesity. He published the records of seven cases in which he had followed this treatment in the Göttingen clinic. In all the cases there was a slight reduction in the body-weight, but not more than could be obtained by proper dieting.

Ebstein gives the following reasons against the use of the thyroid treatment: 1. The results obtained are unsatisfactory, because the diminution in weight is not constant, and may not occur at all. The diminution in weight frequently ceases, even when the thyroid preparation is being administered or shortly after it is stopped. There is no improvement in the patient's subjective feelings under the treatment.

2. The treatment is not a rational one. The ideal treatment is the one where only the fat is lost. In the thyroid treatment there is waste of the body albumin as well, as the studies in metabolism have shown.

3. Any improvement following the administration of thyroid preparations can be obtained with less danger by proper dieting.

Acute Diffuse Myocarditis.—G. FREUND calls attention to the difficulty of diagnosis in acute purulent myocarditis and the frequency with which it is associated with rheumatism and diseases of the joints. In his case the process developed during an attack of subacute rheumatism. The clinical symptoms were not very clear. In the beginning the mental symptoms suggested salicylic-acid poisoning, but on discontinuing the drug there was no change. The increasing paleness, the large size and hardness of the spleen, and the pain under the sternum suggested leukæmia, but the blood examination was negative. A cerebral affection, especially meningitis, was considered, but discarded as the result of negative lumbar puncture. Because of association with rheumatism, and the presence of a normal temperature, with dull heart-sounds, a diagnosis of endocarditis was made. The author cites a number of cases from the literature in which acute purulent myocarditis was proved post-mortem to be associated with or a sequel of rheumatism and diseases of the joints. The signs and symptoms often are so contradictory in different cases that it is impossible to lay down rules for diagnosis. The differentiation from endocarditis and pericarditis is most difficult. The persistent pain in the præcordia has been mentioned by many observers, and is often associated with a feeling of anxiety in contrast to the absence of other threatening symptoms. The exclusion of endocarditis and pericarditis is always essential.—*Berliner klin. Wochenschrift*, 1898, Nos. 49 and 50.

Typhoid Fever and Trichinosis.—H. FISCHER (*Deutsche med. Wochenschrift*, 1898, No. 52) reports an old observation, being the case of a young butcher who developed typhoid fever and trichinosis simultaneously. Two days after eating excessively of raw tainted meat he had chills, loss of appetite, pains, and great weakness of the limbs. Six days later he was admitted to the hospital with all the signs of a severe typhoid. A large bed-sore developed over the sacrum. On removing the gangrenous tissue a piece of healthy muscle was accidentally cut away, which even to the naked eye appeared thickly studded with trichinæ. Microscopical examination showed the trichinæ to be very near each other and encapsulated, the capsules still transparent, and the parasites very lively. The patient died of pneumopleuritis. The autopsy showed the typical lesions of typhoid fever in the ileum. There were many trichinæ in all of the muscles. The clinical signs of trichinosis were unimportant, those of typhoid fever dominating the clinical picture. Neither œdema nor stiffness of the muscles was observed. The trichinæ grew and increased undisturbed by the high septic fever or the changes in nutrition and structure of the muscles caused by the typhoid fever.

Peptic Duodenal Ulcer.—In opposition to the generally accepted opinion BURWINKEL (*Deutsche med. Wochenschrift*, 1898, No. 52) contends that it is possible to differentiate duodenal ulcer, *intra vitam*, from round ulcer of the stomach, and adds to the eight and five cases reported by Chvostek and Boucquoy, respectively, five of his own. All the patients gave a history of long-continued bending over while at work. In four there was a family history of tuberculosis, and in the fifth it could be looked on as probable. His diagnoses, however, were not confirmed by autopsy. The points upon which he based his diagnosis are the following: 1. Melæna not to be explained by tuberculosis, cancer, or "essential" intestinal hemorrhage. The actual hemorrhage is often associated with syncope and vomiting, with no blood in the vomitus 2. The seat of the pain is not always in the right hypochondrium, as has been supposed, but at times in the region of the navel, or between that and the right costal border. The pain does not radiate to the back, as in gastric ulcer, and usually appears two or three hours after meals, or later, if the gastric digestion is delayed. 3. In all the cases there is a history of prolonged dyspepsia, in which the symptoms of ulcer appear at intervals. In the dyspepsia constipation is the rule, but the tongue is rarely so coated as in chronic gastritis, and there is no *fœtor ex ore*. The appetite is retained, even in the attacks—a fact that has been used to explain the speedy improvement in many cases. Icterus is rarely pronounced, and probably occurs only when the ulcer is near the orifice of the common duct. 4. Duodenal ulcer often affects men in the prime of life—strong and robust, and, in most of the author's cases, careful in their mode of life. The author's remarks on prognosis and treatment present nothing new.

The Coincidence of Bitemporal Hemianopsia and Diabetes Insipidus.—SPANBOCK and STEINHAUS have investigated this subject, concerning which it has been assumed by many that there is a frequent association, yet the anatomical basis of which is, *a priori*, difficult to understand. Out of some fifty cases of temporal hemianopsia polyuria has been noted in eleven. In six of these there is no clinical evidence of the existence of diabetes insipidus. In four more the bitemporal hemianopsia is not conclusively demonstrated, and the symptoms point to wide-spread lesions of the brain. There remains only the case of David, in which the hemianopsia, though not entirely pure, was present with normal eye-grounds, and repeated examinations put the diagnosis of diabetes insipidus beyond doubt.

The authors add a case of their own. This was in the case of a married woman, aged thiry-three years, syphilitic. Polyuria and polydipsia appeared, soon followed by loss of vision in the temporal fields. Examination showed a typical bitemporal hemianopsia. The urine amounted to six litres in twenty-four hours, specific gravity 1003, pale and clear, without sugar or albumin. A diagnosis of syphilitic disease in the floor of the fourth ventricle and the optic chiasm was made, and treatment with injections of mercury sozojodolate, with large doses of potassium iodide, begun. After the third injection the eye-symptoms improved, and after the fourth they disappeared, though the diabetes persisted. Still later the latter ceased, and the patient regained her former weight and health. From this case the authors conclude that the combination of diabetes insipidus and hemianopsia is purely accidental, and that the course in any case will depend on the nature of the lesions concerned and the possibility, as in their case, of successful treatment.—*Deutsche med. Wochenschrift*, 1898, No. 52.

PEDIATRICS.

UNDER THE CHARGE OF

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Classification of the Anæmias of Infancy.—JOHN L. MORSE (*Archives of Pediatrics*, November, 1898, p. 815) reports a marked case of anæmia in a child of ten months, characterized by enlargement of the liver, spleen, and glands, with moderate increase in the number of leucocytes, poikilocytosis, and a great preponderance of large, nucleated forms, suggesting a pernicious anæmia. The diminution in the number of red cells was slight, however, and much less than that which usually occurs in this condition. The increase in leucocytes was moderate, being much less than that which usually occurs in leukæmia, which disease was suggested by the enlargement of the liver, spleen, and glands. The clinical history and blood condition corresponded pretty closely to those of "anæmia infantum pseudo-leukæmica," as described by Luzet and Alt and Weiss. This condition, however, the author thinks cannot be considered as a disease *sui generis*, but merely as a severe form of secondary anæmia with leucocytosis, and under this head he classes the case described, which he considers simply as an example of a large and irregular class of cases. The cause of the anæmia in his case was undoubtedly to be sought in general malnutrition resulting from improper food; while the splenic tumor was regarded as a mere coincidence, a result of the same cause, as shown by the fact that it became smaller as the case progressed, and probably finally disappeared altogether.

He refers to the difficulty in classifying the anæmias of children owing to the tendency to exaggeration of changes and to reversion to a younger or to a fœtal type of blood; to the frequency of splenic enlargement in all forms of blood disease in infancy; to the greater rapidity and degree in which leucocytosis develops in children, and to the fact that myeloycetes occur in less severe conditions and in greater numbers than in adults, and that the percentage of hæmoglobin is almost always relatively low. For these reasons he believes that only a very simple classification is justifiable in the light of our present knowledge, and he suggests the following modification of Monti's as a fairly satisfactory one: *Secondary*—Mild anæmia, mild anæmia with leucocytosis, severe anæmia, and severe anæmia with leucocytosis. *Primary*—Pernicious anæmia, leukæmia. In all these forms there may be greater or less splenic enlargement. Splenic tumor, therefore, is of little or no aid in the differential diagnosis of the anæmias of infancy. Under the head of severe anæmia with leucocytosis, he thinks, for the present, must be included all those anomalous cases which do not correspond to the type of either pernicious anæmia or leukæmia, and in this class he includes the cases which have hitherto been described as anæmia infantum pseudo-leukæmica.

Cyclic Vomiting.—H. B. WHITNEY (*Archives of Pediatrics*, November, 1898, p. 839) details a typical case and reviews the literature of the subject, starting with Leyden's description under the head of periodical vomiting, which appeared in 1882. The affection is rare. It is often very severe, and attacks come on without discoverable cause and persist for from twelve hours to four or five days. These gastric crises occur at intervals of from six weeks to six months. In the author's case an interval of three months was observed between attacks occurring over a period of a year, excepting one interval of two months, and in several instances they fell upon the same day of the month. Pathologically, the affection seems to be a gastric neurosis. In certain cases migrainous attacks have alternated with those of the purely gastric condition, and Rachford has observed a gradual transition with advancing youth from early cyclic vomiting to a definite migraine. It is interesting to observe that Rachford has found a large excess of poisonous alloxuric bodies, particularly paraxanthin and heteroxanthin, in the urine of persons suffering from such crises as those of migraine and periodical vomiting.

Whether or not this affection is lithæmic in character, it is certain that there are important predisposing factors, among which are early age. In most cases, also, there is probably a decided neurotic taint, either in the child's past history or in his parentage. It was so in Rachford's cases, and in the one reported by the author the child was thin, nervous, and rather precocious, with gout, migraine, tuberculosis, and insanity in its immediate ancestry. Treatment embraces general hygienic measures, the use of large quantities of fluid, especially milk, and some one of the various lithia waters, with salol or salicylic acid, and the maintenance of an active condition of the bowels.

Unusual Complications of Epidemic Parotitis.—W. ZINN (*Centralblatt f. die med. Wissenschaften*, 1898, No. 51) reports two cases that show that inflammation of serous membranes may occur occasionally in the course of this disease. In the first case, a school-boy, aged thirteen years, there developed during the course of the disease high temperature and endocarditis, with signs of mitral insufficiency. The symptoms became insignificant after the subsidence of the disease. The second patient, a man, aged twenty-two years, when first examined presented high fever, diarrhœa, and symptoms of peritonitis. On the seventh day double parotitis developed, and with resolution the abdominal symptoms disappeared.

A severe acute nephritis was reported recently by C. G. KERLEY (*Archives of Pediatrics*, February, 1898), beginning on the sixth day of an attack of mumps in a boy aged four years. Under appropriate treatment the urine became normal at the end of six days.

The Value of Metallic Percussion Combined with Auscultation in the Diagnosis of Pleural Effusion in Children.—MOUSSOUS (*Revue mensuelle des Maladies de l'Enfance*, January, 1899, p. 1) calls attention to metallic percussion with auscultation (the coin-test) in the diagnosis of pleural effusions in children, and considers it a most valuable means in distinguishing between the dulness due to pleural effusion and that depending upon pulmonary consolidation.

The value of the coin-test in adult patients in conditions other than pneumothorax has already been investigated by Pitres, and later by his pupil, Sieur. Their observations have shown that when the lung is healthy the sound transmitted to the ausculting ear is obscured, smothered, and without metallic timbre. In the presence of a liquid effusion, however, whether it be serous, fibrinous, purulent, or sanguineous, formed in a pleural cavity free from adhesions, the transmitted sound has a clear, sharp, metallic ring.

Ordinary congestions of the lung and the ordinary inflammatory or neoplastic indurations fail to give the coin-test in its purity. The same is true of broncho-pneumonic foci, hæmoptoic infarcts, tuberculous infiltrations, and even encysted pleurisies and liquid effusions of the pericardium. Not only may the presence of fluid thus be recognized, but also the upper limit of the effusion in pleuro-pneumonia and the portion of the zone of dulness which corresponds with the effusion in pleurisies with false membrane. The author has devoted several years to study of this test as applied to young infants with the hope of proving its value in a class of cases which offers greater difficulties in diagnosis than do similar conditions in the adult, and has demonstrated to his satisfaction that this test constitutes a very valuable addition to the ordinary methods of diagnosis.

He finds that in the young child, as in the adult, the metallic click is muffled and loses its ringing timbre in traversing a healthy lung. The percussion should be made more gently than in the adult, and the non-auscultating ear should be stopped. The same quality in the transmitted sound is to be observed with broncho-pneumonia and croupous pneumonia. In these cases auscultation is made at the point where the vesicular murmur was suppressed or replaced by râles (whether dulness be present or not), the percussion being practised at a point on the hemithorax diametrically opposite. Not only is the sound impure and without metallic ring, but the sound of the stroke itself is enfeebled, and is notably more muffled than on the healthy side; sometimes it disappears entirely. In the presence of pleural effusions, however, the coin-test was very clear in four out of seven cases, and in the remaining three cases was clearer than on the healthy side, but lacked the silvery quality. In six cadavers of young infants varying in age from a few days to one year, with one of a child of six or seven years, artificial pleural effusions were produced with varying quantities of liquids, and the coin-test compared with the results before injection. In no case was the metallic timbre observed before the effusion was produced, while in only two instances did the sign fail, and in one of these the sound was clearer, but its metallic quality was not distinct. In both these cadavers, however, larger quantities of fluid (above 200 grammes) gave a successful test.

[When one considers the frequent confusing results offered by physical examination of the chest in young children, even when fluid is present in considerable amount, the value of an additional physical sign, though not absolutely pathognomonic, cannot be too highly estimated. It is to be hoped that more extensive clinical experience will confirm the promises of Dr. Moussous's observations.]

Sudden Death in the Course of Addison's Disease in Childhood.—VARIOT (*Journal de Clinique et de Thérapeutique*, 1898, No. 2, p. 23) reports two cases of Addison's disease in girls of fourteen years and fourteen and one-half years of age, which terminated suddenly in death, due probably to syncope. In the second case autopsy was made. There were extensive and thick adhesions of the costal and parietal pleura; disseminated miliary tubercles in both lungs. The heart was relaxed, but without valvular lesions. The liver was adherent to the diaphragm and to adjacent organs by quite firm false membranes. The kidneys were normal in appearance. Both suprarenals were greatly enlarged and of firm consistence. On section the greater part of the parenchyma was replaced by caseous, confluent yellowish tubercles.

The author thinks that sudden death is relatively frequent in the course of Addison's disease in the child, for of four cases which he has observed, two terminated in this manner.

The Influence of Phosphorus upon Rachitis.—MIWA and STOELTZNER (*Jahrbuch f. Kinderheilkunde*, Bd. xlvii. S. 153) have made a series of experiments in Heubner's laboratory by giving phosphorus to rabbits and hens, and then after a time examining the bones of these animals to discover the changes therein produced by this drug. In comparing the bone lesions observed in these animals with those of rachitis and those produced in workers in phosphorus, they have found that under the influence of this drug the normal spongy tissue is replaced by a sclerotic tissue, and that this effect is produced wherever the bones have a tendency to become porous. As osteoporosis and osteosclerosis are antagonistic processes, phosphorus may be considered as a direct remedy against osteoporosis. In rickets, however, the anatomical lesions are quite different, and, therefore, phosphorus cannot be considered a direct or specific remedy in this affection.

[These results confirm the earlier experiments of Wegner along the same lines, and give support to the skepticism with which many observers regard Kassowitz's enthusiastic advocacy of the phosphorous treatment of rickets to the exclusion of the well-founded claims of cod-liver oil.]

The Bacteriology of Pertussis.—O. ZUSCH (*Münchener med. Wochenschrift*, 1898, No. 23, S. 712) describes a bacillus which he has constantly found in the sputum of twenty-five children suffering from this disease. It is found in profusion in the mucus, more rarely in the interior of the cells, grouped irregularly, often in clumps.

This organism is best cultivated upon agar mixed with ascitic fluid, and these colonies flourish upon bouillon and upon gelatin without liquefaction. These cultures are not agglutinated by the blood serum of pertussic patients, but the bacillus is found in the sputum principally during the first two or three weeks of the disease—that is, during the initial catarrhal stage and at the beginning of the convulsive stage. If extensive bronchitis occurs the number of bacilli is considerably diminished. In one case in which a broncho-pneumonia interrupted the convulsive cough the bacilli disappeared from the sputum. Intratracheal inoculations failed in the dog, rabbit, guinea-pig, and white mouse.

Paralysis in Whooping-Cough.—LEROUX (*Journal de Clinique et de Thérapeutique Infantiles*, 1898, Nos. 13–17) presents a study based upon thirty-eight cases. Naturally, very young children, from one to five years of age, furnish the largest proportion of the cases, and such accidents usually appear during the convulsive stage or in its decline. Almost always the disease is severe, with violent paroxysms, fever, and often complicated with secondary infection, like broncho-pneumonia, and sometimes by coincident infections (influenza, scarlatina, tuberculosis). Four groups of cases, from a symptomatic stand-point, may be recognized:

1. *Cerebral Paralysis.* The onset is usually sudden; during a paroxysm convulsions occur, followed by coma, which terminates in death or in return of consciousness, when the paralysis becomes manifest. More rarely hemiplegia or monoplegia comes on slowly. Exceptionally the child develops a cerebral encephalopathy analogous to that of rheumatism: convulsion, coma, hyperpyrexia, and death; and, again, may quickly succumb to a true apoplectic stroke. Most frequently, however, with or without convulsions or coma at the onset, any of the varieties of hemiplegia may be observed: simple hemiplegia with facial palsy and attacks of Jacksonian epilepsy; slowly developing left hemiplegia with conjugate deviation of head and eyes to the right. Again, one may encounter diverse monoplegias, aphasia with hemiplegia or monoplegia, and sensory aphasia. And, finally, to complete

the list, may be added transitory hemianopsia, temporary or permanent blindness and deafness, palsy of the sixth and seventh pairs, and hemiplegia with palsy of both motores oculi. These paralyses pass away, in about half the cases, in a few days or weeks. In the remainder permanent lesions remain.

2. *Spinal Paralysis.* Two cases of paraplegia are on record: one of sudden onset during a kink, terminating in recovery (Bernhardt); the other complicating a febrile attack (Mœbius).

3. *Peripheral Paralysis.* Two cases may be attributed to peripheral neuritis: palsy of the flexors and abductors of the feet and great toes (Surmay), and palsy of the posterior crico-arytenoids (Jurasz); two others to polyneuritis; ascending palsy of the four members and of the muscles of the head, and paralysis of diaphragm, with recovery (Mœbius); paralysis of the limbs, of the nuchal muscles, and of the deeper muscles of the back, also terminating in recovery (Moussous).

4. *Cerebro-spinal Paralysis.* One case of disseminated sclerosis is recorded (Sparks). Prognosis is serious, being the graver the younger the child. Of the thirty-eight cases collected six resulted in death; in one-third of the cases paralysis persisted; while in half complete cure resulted in from several days to several weeks.

In the few autopsies made the following lesions of the brain, sometimes of the cord, have been encountered: congestion, hemorrhages within or without the meninges or in the brain, foci of softening, vascular changes, and dissecting capillary aneurisms.

Laryngeal Complications of Measles.—FRAENKEL (*Revue mensuelle des Maladies de l'Enfance,* October, 1898, p. 508) reported to the Société de Biologie de Hambourg four cases of measles terminating fatally with laryngitis, in which the autopsies showed ulceration of the vocal cords and of the arytenoid region of the larynx, in some portions involving the structures down to the perichondrium and even the cartilage itself. Had recovery taken place these lesions would have been followed by phonative or respiratory disturbances. These lesions are comparable to the laryngeal ulceration or necrosis observed in typhoid or typhus fevers.

A Method of Obtaining Sputum of Young Children for Bacterioscopic Examination.—H. MEUNIER (*IV. Congrès pour l'Etude de la Tuberculose,* Paris, 1898) practises a simple lavage of the stomach in order to obtain the swallowed bronchial secretions; in these masses the tubercle bacillus is sought for by the usual methods of examination. The lavage is best practised in the morning fasting, shortly after the fits of coughing that almost always occur after waking. This method is only applicable to cases in which there is a purulent bronchial secretion. Negative findings after several examinations of the sputum, in the face of positive physical signs of softening or suppuration, will greatly aid in excluding tuberculous disease and confirming the existence of one or other of the conditions associated with pulmonary suppuration, such as dilatation of bronchi, encysted or interlobular pleurisies discharging through the bronchi, and ulcerating broncho-pneumonia.

SURGERY.

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The Radical Treatment of Hydrocele.—After repeated trials, with varying success, in the radical treatment of hydrocele by the methods at present in vogue, BLOCH (*Revue de Chir.*, February 10, 1898) finds that none are entirely satisfactory or reliable.

The essentials of a radical treatment are that it shall be without danger; that it shall prevent recurrences; that it shall be without pain; and, finally, that it shall permit the patient to resume his ordinary business in the shortest possible time.

The following method, which the author has performed forty times, fulfils all these indications:

A sufficiently long incision is made to permit a complete reversal of the tunica vaginalis, so that it and the testicles are entirely exposed to view and can readily be treated. If there are any excrescences they are cut off. The entire surface of the tunica vaginalis is then vigorously scrubbed with sterilized gauze soaked in a 3 per cent. carbolic solution. Care should be taken to touch all the serous surface, the testicle, and all the little folds. The testicle is then reduced into the scrotum, the cavity packed full of iodoform gauze, one end of which should protrude from the wound, and an aseptic or antiseptic dressing applied.

Three or four days later the iodoform gauze is removed. Frequently it will require considerable force to extract it, and there may be a slight hemorrhage; if not, the entire cavity is found to be dry. The wound is then closed with catgut without drainage, and an iodoform gauze dressing applied with some sterilized cotton and a suspensory bandage. The sutures are applied in the skin only, and do not include the tunica vaginalis.

The complete evisceration of the testicle and reversal of the tunica vaginalis are essential to a complete operation. The rubbing modifies the serous surface so that it does not secrete, and the carbolic solution coagulates the albumin of the epithelium. The inflammatory reaction produces a discharge which must be absorbed, hence the use of iodoform gauze packing, which also favors an acute reaction, and this favoring adhesive inflammation of the tunic. The sutures close the wound and prevent infection. There is no pain, and the patient can get about the day after the sutures are removed, and sometimes the day after the operation. In one case only—in a patient sixty years of age, where vigorous rubbing could not be employed—was a relapse found, although all the cases were examined, some after a lapse of five years.

The employment of general anæsthesia is preferred, as vigorous treatment under other conditions produces too much pain. The testicle is most readily reduced by holding the edges of the wound well open with forceps.

Penetrating Gunshot-wound of the Abdomen; Immediate Laparotomy; Suture of Stomach; Recovery.—In connection with the recently reported results on the operative and non-operative treatment of this form of injury occurring in battle, the successful operation reported by COUSINS (*British Medical Journal*, July 16, 1898) and the inferences he draws regarding treatment are of especial interest:

The patient received a wound which passed entirely through the abdomen and involved the stomach. Severe pain immediately followed the accident; the patient was cold and livid and the pulse rapid and wiry, about 150 per minute.

After a time the patient rallied sufficiently upon stimulation with brandy and strychnine to make an operation possible. The wound of entrance was followed, the wound in the stomach found and closed, and the patient made a complete recovery.

Regarding treatment by immediate laparotomy the author says: "We may now accept it as a surgical axiom that in every case of penetrating wound in which there is reason to believe that an internal injury has been inflicted, the abdomen ought to be opened, with the intention of arresting hemorrhage, securing by suture any lacerated or wounded organ, removing blood or any other extravasated fluid, and cleansing the peritoneal cavity. In cases of gunshot injury, whenever a projectile has penetrated the abdomen and urgent symptoms are present, it is surely useless to hope that the viscera have escaped damage. As soon, then, as the patient has sufficiently rallied from the shock an exploratory operation is clearly indicated, and any delay for the development of more urgent symptoms aggravates the danger, as these can be only the outcome of pathological changes which are associated with septic poisoning and fatal peritonitis. In many cases the chance of success rests wholly on immediate action."

Successful Operation for Perforating Gastric Ulcer.—CAMPBELL (*British Medical Journal*, July 16, 1898) reports a successful operation for gastric ulcer. The success he attributes to the early diagnosis and immediate operation. There was a considerable amount of lymph and milky fluid present in the peritoneal cavity. It was, however, localized and the infection had not become general. The perforation was about half an inch in diameter. The peritoneum was sponged out after plugging the wound with gauze. Freshly boiled towels were packed in the peritoneal cavity and the stomach brought to the surface. The edges of the perforation were freshened and then sutured with a continuous silk suture that took in the entire thickness of the stomach. A dozen Lembert sutures were then applied and the wound finally covered by a piece of peritoneum. The peritoneum was again carefully sponged and a drain of gauze inserted where the largest amount of gastric contents had been. The remainder of the abdominal wound was closed.

Nutrient enemata were kept up for five days; then water was given by the mouth, followed by animal extracts, and then milk. The gauze drain was removed on the fifth day. The pulse and temperature fell shortly after the operation, and the patient made a complete and permanent recovery.

A New Suture for the Intestines.—Barker (*British Medical Journal*, July 16, 1898) describes a new self-feeding needle and holder with which he is able to place in the intestine with an ordinary fine sewing-machine needle a suture that is like the sewing of a machine. It is, however, capable of introducing any form of stitch desired. The handle of the needle-holder carries three reels of thread and holds the needle in any desired position. In introducing the sewing-machine stitch the following method is employed: The needle is passed through the tissue and the loose end caught and drawn out a little longer than the length of the wound. The needle is then passed a second time and withdrawn slightly, leaving a loop; the loose end of the thread is passed through this and drawn tight at the same time the needle is withdrawn and its thread tightened. The same process is carried out with each stitch to the end, where the final stitch is tied. This saves all the time and trouble of tying the sutures, with the exception of the last. The self-threading needle the author does not claim to be new, but the stitch he believes to be new and original.

Colica Vermicularis.—Goldbach (*Prager med. Wochenschrift*, 1898, No. 16) reports a case of this disease which has been described by Bruer. It is a condition of colic in the vermiform appendix occasioned by a catarrhal inflammatory process in which only a slight irritation of the serous covering of the appendix is produced. It is the result of a blocking of the outlet of the appendix, which can be produced by different forms of calculi, by the contents of the bowel, and by bacterial action. It can also be the result of an inflammation of Gerlach's valve, which closes the lumen of the appendix. The symptoms are pain localized in the appendiceal region, but with an entire absence of fever and complete freedom from all symptoms between the attacks. There is no implication of the serous covering of the appendix. In the case reported by the author it was found that the entrance into the appendix had been closed by an intestinal concretion which readily slipped in and out, thus accounting for the intermissions between the attacks.

Case of Removal of the Entire Stomach for Carcinoma; Successful Œsophago-duodenostomy; Recovery.—One of the successful operations that have followed the removal of the entire stomach by Schlatter, of Zurich, is reported by Brigham (*Boston Medical and Surgical Journal*, May 5, 1898).

The patient was a woman of good constitution, aged sixty-six; she was particularly fitted to stand the operation by reason of her simple tastes and even temperament.

On opening the abdomen the tumor was found to comprise nearly half of the wall of the stomach; there was no marked glandular involvement or adhesions, and it was determined to remove the whole organ. The greater and lesser omentum were tied off and divided; the duodenum was clamped and a ligature was placed around it half an inch above the clamp, and the tissues were divided between the two. The ends were washed in salt solution and wrapped in iodoform gauze. The same method was employed with the œsophagus and the cardiac end of the stomach. It was found that the œsophagus and duodenum could be brought together, and they were united by a Murphy button to shorten the operation, as the patient was growing weak. No Lembert sutures were applied, as the approximation was good. The peritoneum was closed by catgut suture and the abdominal incision by silkworm-gut. There was practically no loss of blood. The operation lasted two hours and a quarter, and was followed by a considerable amount of shock. The patient, however, made a complete recovery and was gaining in flesh and strength. The case was one particularly adapted to the operation, as the patient had been compelled to live on a semi-solid diet on account of her age and deficient teeth.

Excision of Carcinoma of the Sigmoid Flexure.—BARLING (*Birmingham Medical Review*, March, 1898) reports two cases in which he removed carcinomatous tumors from the sigmoid flexure. In the first case, a male, aged thirty-nine years, had been troubled for some time by constipation and difficulty at stool, which was relieved by laxatives. Examination under ether failed to reveal a tumor, but when he returned a year later it was readily detected. It was removed and an artificial anus was formed, which the patient preferred to have remain open. Recurrence following in a year, a further section of the bowel was excised and enterorrhaphy was performed. The patient died from an acute volvulus of the small intestine on the third day after operation.

The second case was in a pregnant woman, the tumor blocking the pelvic outlet. Its true nature was not diagnosticated till the tumor was exposed. The section of gut was excised and an artificial anus was formed. The patient recovered and bore a child at term. Recurrence took place in this case also, though at such a point that removal was impossible.

Primary Sarcoma of the Intestines.—SMOLER (*Prager med. Woch.*, 1898, No. 14), in discussing a series of thirteen cases of primary sarcoma of the intestines, says that they are always infiltrating in their character, affecting the entire intestine and increasing its size. They usually take up a considerable portion of the intestine. Histologically, they are usually sarcomata of mixed cellular type, though occasionally one sees a case that is lymphadenoid in character. Metastases are numerous and most frequently affect the lymphatic glands of the mesentery; in one case only were these glands not involved.

The part of the intestine attacked was in seven cases the ileum, twice at its lower end, three times the jejunum and ileum, and twice the cæcum. In one case there was in addition an adenosarcoma of the pyloric end of the stomach. Males were the subjects of the disease ten times; females three times. The majority of the cases were in the fortieth year.

The enlargement of the intestine, which is the general rule, the author believes, with Kraus, to be due to the destruction of the normal elasticity of the intestine by the sarcomatous infiltration and its dilatation from the pressure of the intestinal contents. This seems to be substantiated by the fact that in the cases in which pyloric stenosis was present no marked increase in the lumen of the intestine was found.

That ulceration does not occur frequently is probably accounted for by the fact that dilatation is so commonly present.

The distention of the intestine in these cases must be considered as typical of this disease; this is also borne out by the clinical fact that these tumors, though large in size, may lead to the death of the patient without a symptom of stenosis having been manifested.

The Surgical Treatment of Cholelithiasis.—A series of obscure cases in which no biliary calculi were passed leads STEINTHAL (*Deutsche med. Wochenschrift*, 1898, No. 13) to give the following as some of the special diagnostic symptoms in certain forms of cholelithiasis:

1. Attacks of colic, either with or without icterus, when gallstones have been passed on previous occasions, indicate that there are multiple calculi present.
2. Attacks of colic, either with or without icterus, when there is positive evidence that no stones have been passed, indicates a large obstructing stone with or without other smaller stones.
3. Attacks of colic without icterus, when it is positively known that no stone has ever passed, make it probable that there is a large stone present in a diverticulum of the gall-bladder.
4. Attacks of colic without icterus, but with the passage of a large stone, point to an abnormal adhesion of the gall-bladder and bowel and the passage of the stone by ulceration.
5. If there is a rise of temperature accompanying the attack, suppuration is probable as a complication.

In all these conditions surgical intervention is indicated.

Post-typhoid Cholecystitis.—Recent advances in bacteriological research have shown that those usually called pyogenic cocci are not the only forms of bacteria that are capable of producing suppuration. IMHOFER (*Prager med. Wochenschrift*, 1898, No. 15) adds another case to those already reported in which bacteriological research has demonstrated the fact that cholecystitis may result from the infection of the biliary tracts by the typhoid bacillus. It has been shown that this sequela of typhoid may occur after a period of apparent perfect health and recovery from the disease. The period varies in length from two or three months to as many years, and even longer in perfectly authentic cases, where the diagnosis has been corroborated by bacteriological examinations. It has also been shown that biliary calculi may form with a mass of bacteria as their nucleus.

Liver Abscess.—POWELL (*Indian Medical Gazette*, February, 1898) makes a plea for the more accurate diagnosis and localization by laparotomy of surgical diseases of the liver. He shows that accurate diagnosis is impossible in any other way, and that the risks attendant upon aspiration or exploration by the trocar are very great and altogether unscientific and unworthy of the recent progress in surgery. Why should such procedures be employed in disease of the liver when the diagnosis of disease in the pelvic viscera or of the appendix is regularly made by an exploratory laparotomy?

He proves the force of his remarks and the value of such exploratory laparotomies in these cases by detailing a number of successful operations which have been the result of interference based on this line of reasoning.

THERAPEUTICS.

UNDER THE CHARGE OF

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Ether Pneumonia.—DR W. T. MCCARDIE notes among prophylactic measures the turning of the head to one side during anæsthesia; the use of a small quantity of ether given with exact regulation by an inhaler, in preference to a large quantity given by a more open method, which results in greater chilling, irritating, and depressing effects on the air-passages; cleansing of the nasopharynx, nasal passages, mouth, and throat previous to etherization, which is not necessary in most cases; and noting the importance of coughs and colds as contraindications. It is advisable that the length of operations should be minimized, and that the surgeon should cultivate a dexterous speed in the interest of his patient. During and after operations unnecessary exposure of the patient should be carefully avoided, and during a laparotomy a hot-water chamber beneath and long hot-water bottles at the side of the patient will greatly lessen the danger of chill and depression of the vital powers. In treatment morphine and atropine have been recommended, but the former drug must be given with great care. Alkalies and expectorants are of great service for loosening secretions and stimulating excretion; otherwise the treatment is the same as in the ordinary forms of pneumonia.—*Treatment*, 1899, No. 22, p. 697.

[It is incredible that the mortality from ether-pneumonia can be as quoted in the paper—almost 50 per cent. If this is in any degree the truth, ether must never be administered to subjects already affected by respiratory or renal diseases. An extended experience in this form of pneumonia would indicate that morphine and atropine are absolutely contraindicated, and alkalies and expectorants have but extremely limited use. When death occurs—and it has been in much less than one-half the percentage quoted—it has been caused by right-heart paralysis. The remedies of most value are nitroglycerin and strychnine, and the dose adjusted to the necessities of the patient. Ether-pneumonia is a medical, not a surgical, disease, and requires prompt, scientific, and experienced treatment by a physician.—R. W. W.]

Oxycamphor.—DR. ALFRED EHRLICH presents this as remedy for dyspnœa in that it diminishes the irritability of the respiratory centre. This is not obtained by direct oxidation of camphor, but by the replacing of a hydrogen atom by a hydroxyl group in the camphor molecule. It occurs as a colorless, crystalline powder, which when fresh is odorless, soluble up to 2 per cent. in cold water, but in hot water or alcohol is much more soluble. Its solution is almost tasteless or slightly bitter; is neutral in reaction, and in exhibition of fresh drug forms an absolutely clear solution. In the presence of light and moisture it readily changes its appearance and composition. Investigation as to the effect of this remedy upon the circulatory system and the temperature shows that its influence is not worthy of mention. To be sure, the pulse-rate diminishes to the extent of ten to twelve beats per minute, but this slowing may be accounted for by the improvement of respiration following its use. It may be administered as compressed tablets with sugar of milk, each containing four grains of the active substance. For administration, to avoid gastric disturbance, these tablets may be dissolved in hot water and given in solution with syrup. Better is the use of gelatin capsules. The daily amount may be as much as thirty grains. The instances of its use which are reported seem to confirm the statement made as to its properties. As a direct result of the relief of the dyspnœa, sleep is greater in amount and more restful.—*Centralblatt für die gesammte Therapie*, 1899, Heft i. S. 1.

Annual Report of the Loomis Sanitarium for Consumptives.—DR. J. EDWARD STUBBERT reports methods of treatment as follows: Antitubercle serum gives three marked results, viz., reduction of temperature, decrease of tubercle bacilli, and possible subsequent immunity. Its effects are not deleterious, a larger percentage of improvement follows its use than in the case of creosote, and, lastly, the moral effect on the patient is of value (?). This serum, however, has been discarded in all save incipient cases. Fischer's serum was tried in four cases and found unsuccessful. Hirschfelder's oxytuberculin was also given a trial, but such large amounts had to be injected that the patients rebelled, and it was abandoned. Antistreptococcic serum (Pasteur) was used in ten cases showing streptococci. The results were very gratifying. In eight of the patients the streptococci entirely disappeared, following one or two injections of the serum, for periods varying from a few weeks to a number of months. In one instance three injections were given without any effect. In the tenth case, curiously, tubercle bacilli disappeared, but streptococci remained present in large numbers. The author hopes that by the use of this anti-streptococcal serum the unfortunate complication of mixed infection (usually streptococcic) can be eliminated, and that thus the growths of pure tubercle bacilli can be combated more successfully with anti-tubercle serum. In laryngeal tuberculosis where ulceration was present, six patients were discharged healed, three improved, three stationary, and two worse. This is a better showing than those from the sanitarium in Colorado, where only 25 per cent. are discharged with ulcerations healed. Ichthyol is recommended in genito-urinary and intestinal as well as pulmonary tuberculosis. As much as one drachm in a day can be taken without gastric disturbance if keratin coated pills are prescribed. As a substitute, ichthalbin may be used; dose: one to one and a half drachms daily. Kalagua, a new South American drug, gave good results in six cases in which it was tried. Creosote was also used in about two dozen instances. The author objects to it because of its harmful effects on the stomach, intestines, and kidneys. Guaiacol gives improvement in 75 per cent. of the cases. Oil of cinnamon caused improvement in the cases in which it was used; dose: thirty to forty minims. In sixty-one cases where hot-air inhalations were employed, forty-seven showed improvement in cough. Pneumochemic treatment is useful in excessive bronchorrhœa, but deprives the patient of three or four hours daily out of doors. Ozone and static electricity are beneficial as general tonic treatment.—*Philadelphia Medical Journal*, 1898, vol. iii. p. 155, No. 3.

[If cresosote had been employed as creosote carbonate, no digestive disturbance would have appeared. The discredit of the creosote treatment is the fault of the physician, not of the drug.—R. W. W.]

Reinforcement of the Bromides in Treating Epilepsy.—DR. F. X. DERCUM prefers ammonium bromide as the least depressing in its effects. Antipyrine associated with it increases its activity, so that when combined fifteen will often be found as efficacious as thirty or thirty-five grains if used alone, and no unpleasant effects follow. To help guard against the mental depression and eruption, various iodides may be used to advantage. Sulphonal is useful in preventing attacks of epilepsy at night. Five to twelve grains often cause a cessation of nocturnal seizures, and sometimes as a further result those during the day also. Another drug used with great success at times is acetanilid in dose of four to six grains after meals. This is thought to act as a germicide, and thus to prevent fermentation. It may influence the blood by clearing the alimentary canal of substances which if absorbed may vitiate it. It is known that when skatol and indol and other substances of like nature are plentiful in the system, the attacks are more frequent. In this way constipation always favors the course of the disease. Gastro-intestinal atony also contributes its effects. These considerations give reason for frequent bathing, exercise, and out-door life, which are so effectual in treating the disease, the excretion of these effete matters being thus aided.—*The Medical Fortnightly*, 1899, No. 1, p. 70.

[The fact that the bromides differ in their action according to the base is often lost sight of by neurologists. The author is quite correct in choosing the ammonium salt.—R. W. W.]

Accidents in Serum Injections for Diphtheria.—DR. SEVESTRE, after praising diphtheria antitoxin, says albuminuria can appear after its use. It must be determined whether albumin was present before the injections or not. In the former case the amount of albumin increases slightly for five or six hours. Later it diminishes. On the whole, there is no unfavorable effect from the serum injection where there is no preceding albuminuria. It is hard to decide whether its subsequent appearance is due to the serum or to the original disease, namely, diphtheria. In any case it is of much less importance than has been thought. All things considered, post-diphtheritic paralyses are rather more common than formerly. The explanation probably is that there are more grave cases surviving under the present treatment, and, consequently, exposed to paralysis. The same can be said in cases of sudden death during convalescence. The serum treatment saves those most severely infected, but it is useless for lesions once produced, especially where employed late in the disease.

Local accidents are: Erythema surrounding the puncture, and abscesses. The former, the cause of which is uncertain, disappears usually under twelve hours. Abscesses are solely the result of careless asepsis. Increase of fever ceases again very quickly. When it persists for several days, pulmonary tuberculosis is probably present. Erythematous eruptions and urticaria rarely appear on the first day, generally on the third or fourth, but sometimes they show themselves on the eighth or tenth day. They are due to the action of the serum as such, and apart from its antidiphtheritic properties, for in using other serums the same type of eruptions is found. They are of little importance.

Later accidents are: A progressive febrile movement, reaching 104° F., and so remaining for four or five days. At the same time appears a rather characteristic eruption, especially about the elbows and knees, and much like roseola. It is largely limited to the extremities. The rash is scarlatiniform in so far as it often begins on the abdomen and chest, and gradually involves the neck, face, and slightly the extremities. The rash appears as a polymorphous erythema finally, always selecting the extremities. Arthralgias occur late in serum treatment, and are wandering, sometimes appearing in one joint, and later in another; a slight febrile movement is often present. The articulations of the cervical spine are especially susceptible. The attack is sudden, and passes off in a few days. Adenitis of the groin, axilla, and neck often appears. This must be differentiated from the adenitis often present in scarlatina. A mucous diarrhœa, difficult to manage, is not uncommon, and with it excitation, even violent delirium. Antitoxin is to be injected as soon as diphtheria is suspected. In a very mild case twenty-four hours may elapse before the first injection is made, a culture being reported on in the meanwhile. In cases of mixed infection the serum treatment is also indicated. Only one real contraindication exists: in a tuberculous patient, when the sore-throat is mild, and the case would be aggravated because of the bad effect of the serum on a pulmonary lesion. The doses of antitoxin as given by the author would not apply in the case of other antitoxin units.—*Journal de Médecine*, 1898, Tome lxx. p. 12, No. 1.

The Treatment of Functional Disorders of the Liver.—Dr. Robert W. Burnett states that pies and pastry, strong soups, made dishes of all kinds, as curries, stews, hashes, entrées, much fat, and fatty foods, cured meats, with the possible exception of boiled or roasted bacon and dried fish, should be avoided. Also rich fish, such as salmon, mullet, mackerel, and eels; rich gravies, sauces, spices, pickles, condiments, new bread, hot rolls, muffins, hot buttered toast, rich cakes, and rich puddings; sugar and all sweets; jam tarts, jams, creams, ices, nuts, and dried fruits; raw vegetables; fruits rich in sugar, as pears, must be avoided. The less alcohol the better. Spirits, sweet champagne, Madeira, sherry, port, Burgundy, liqueurs, cider, ales, and stout are disadvantageous. Eggs, butter, cream, and even milk, must be taken sparingly. The same may be said of farinaceous substances generally, of potatoes, parsnips, and carrots. If alcohol is taken, claret and hock in very small amounts are the best. The quantity of liquid taken at meals should be small, but the daily amount of simple fluids should not be limited.

Free elimination is most desirable and, therefore, the patient should be encouraged to sip half a pint of hot water daily, about two hours after each meal, and also the last thing at night. Of spas recommended the types are Carlsbad and Homburg abroad and Harrogate and Strathpeffer in England. The use of some one of the aperient mineral waters at home is often helpful in connection with other treatment; these may be Alsculop and Apenta. Calomel or blue pills, either with or without the addition of euonymin or podophyllin, are undeniably useful in removing the signs and symptoms of disordered liver. If rapid and vigorous effect is required, two or three grains of calomel given in the evening and followed the next morning by a mild saline, as a drachm of sodium sulphate or two or three drachms of sodium phosphate in hot water, or a wineglassful of one of the aperient waters, will in most cases be followed by eminently satisfactory results. In a few instances the saline does not agree: it teases, gripes, and irritates. If this be so, a few capsules of castor-oil, or one or two drachms of the oil in hot milk, may be given in place of the saline in the morning, followed by a cup of hot tea or water. If a less rapid but more continuous action is desired, one-half grain of calomel, or one-half grain of blue pill with euonymin, iridin, or podophyllin, and extract of colocynth may be given. It is well to add extract of hyoscyamus, powdered capsicum, and oil of cajuput. This pill may be better, in some instances, if followed by a mild saline in the morning and repeated every second or third night for a week or ten days. Podophyllin is an excellent drug when it agrees, but even in small doses may sometimes cause much griping and discomfort. If this proves to be the case one-half to two grains of euonymin or iridin should be substituted. Mineral acids, especially nitro-hydrochloric, have been frequently advocated, but their results have been found to be disappointing. If the tongue is dry and furred, better results are obtained by use of the alkalies. Sodium or potassium bicarbonate with taraxacum and some aromatic, as compound tincture of cardamom, are often beneficial. Ammonium chloride, potassium iodide, and nux vomica must not be forgotten. Exercise in the open air may often be helpful. The activity of the skin must be increased and maintained. The occasional use of the Turkish bath and the warm bath, with plenty of rubbing, is beneficial.—*Treatment*, 1898, vol. ii. p. 661.

Oil of Wintergreen in the Treatment of Chorea.—Dott. H. Fornaca Luigi states that not only is this useful in rheumatism, but it is an antipyretic in erysipelas and scarlet fever with diphtheria, an antiseptic in tuberculosis and other chronic diseases of the respiratory system when inhaled, and when given internally in certain diseases of the kidney and bladder. The daily amount varies from one and one-half to two and one-half drachms when given by the mouth. Noting the rapid systemic effects when applied by inunction incorporated with an equal quantity of white vaseline upon a patient suffering from chorea, it was employed pure upon a second subject, to the daily amount of two drachms. Three cases are reported. It is beneficial not only when rheumatism is an important factor, but when no history of this is obtainable. The remedy is readily absorbed by the skin, showing its presence in the urine within six hours, yet not giving rise to any disturbance.—*La Riforma Medica,* 1898, No. 49, p. 578.

Indications for Digitalis.—M. POTANI calls attention to the vasomotor action of the drug, which is often overlooked; that with a rather generous dose, migraine due to cerebral congestion can be overcome, where a small dose, acting on the circulatory centre, would simply aggravate the condition. Diuresis is produced only in those cases in which there is anasarca, and is due to the anasarca; often there is diuresis without increase of blood-pressure. When the dropsy has disappeared the diuresis ceases. Diminution of the dose is indicated on disappearance of dropsy, for digitalis is then no longer well borne. Its cumulative action is mentioned; the chief indications are increased frequency and irregularity of the pulse and the presence of œdema. In cases the reverse of these it is useless or harmful. Special warning is given against its careless use in myocarditis with fatty degeneration and in cardiac asthenia with dilatation. In cardiac dilatation of gastric origin digitalis is harmful, for it is not tolerated by the stomach. Arterio-sclerosis is not a contraindication if caution is used. Where increased frequency of the pulse or dropsy is present in aortic insufficiency, digitalis is distinctly indicated. Usually these conditions do not exist. The same is true in mitral stenosis. In mitral insufficiency it has its widest use; wait before commencing, because it is late in the disease that digitalis is most needed. When tricuspid accompanies mitral insufficiency, the former, unless great care be taken, is made to disappear too rapidly by digitalis, and pulmonary apoplexy results, through increase of capillary pressure. Of the preparations, the powder is too often emetic and unreliable. Digitalin is preferable.—*Journal de Médecine*, 1898, Tome lxix , No. 23, p. 887.

[The vasoconstriction which is marked after long-continued use accounts for many symptoms generally ascribed to its "cumulative" effect. Fewer deaths from its use have been recorded since the practice of administering a nitrite has become better known.—R. W. W.]

The Use of Formalin for Sweating of the Feet.—DR. GERDECK paints the feet with a brush three times daily, using fifteen to twenty drops of the substance. Over the soles the brush should be carried four or five times, between the toes only once, and no application should be made over the dorsum. Four to six drops may be poured into the boots. The odor disappears, and, besides, the remedy is an excellent preservative of leather. The results last three to four weeks, when the treatment must be renewed. If excoriations are present a slight smarting sensation is produced, which, however, does not prevent walking the next day. The remedy acts as a deodorant, and is not toxic. The skin becomes dry as leather and does not sweat. The suppression of the sweating—according to observations made upon soldiers—appears to be without influence upon the general health.—*La Riforma Medica*, 1898, No. 38, p. 455.

Treatment of Ophthalmia Neonatorum.—DR. L. WEBSTER FOX warns that drastic measures are essential if the cornea assumes a yellowish appearance on eversion of the lid, else perforation is likely to follow. Here a 1 per cent. solution of silver nitrate should be applied to the palpebral conjunctiva, and this followed during the day with a 1 to 5000 solution of sublimate. The mucous membrane must be dried and the pus removed by applying this solution upon a pledget of cotton. The edge of the lids should be anointed with an ointment of yellow mercuric oxide in petrolatum, 1 to 500. The *cul-de-sac*, up and about the retrotarsal fold, should be thoroughly irrigated. If there is tumefaction of the eyelids, impairing the nourishment and circulation of the cornea after the fourth or fifth day, apply a solution of eserine [physostigmine] sulphate in rose-water, 1 to 250, in addition to the above treatment, when decrease of suppuration will be observed. No favorable results have followed the instillations of atropine. The cornea has not been saved after cloudiness has appeared. If the conjunctiva becomes thick and velvety, strong silver nitrate solutions should be applied. Scarification or application of zinc sulphocarbolate may be useful. Recently good results have followed the application of a 50 per cent. solution of protargol.—*The Medical Bulletin*, 1899, No. 2, p. 41.

Stypticin.—Dr. Bossi finds that this remedy [cotaraine hydrochloride] is a uterine hæmostatic without possessing ecbolic properties. He concludes that (1) this is for animals less toxic than the fluid extract of hydrastis, and in patients has not produced any disturbances worthy of mention. (2) Administered to pregnant animals and in gravid women it is not ecbolic. (3) In some instances of pregnancy with threatened abortion, beside a decided hæmostatic action, there is noticed a marked sedative effect upon the uterine muscles similar in part to that of viburnum and explicable by the fact that this substance is analogous to a product of the decomposition of narcotin. (4) For all that its hæmostatic action may not as yet be assumed to be superior to that of hydrastis, it should be considered useful in practice (*a*) in alternation with hydrastis for long-continued use; (*b*) as a substitute when only poor preparations of hydrastis can be obtained, or in idiosyncrasy, or when hydrastis is not well borne by the patient; (*c*) in association with viburnum and piscidia, or alternating with these remedies, in case of threatened abortion with hemorrhage. (5) This remedy can be used by midwives as a hæmostatic without ecbolic properties, and thus do away with the exhibition of ergot.—*La Riforma Medica*, 1898, No. 35, p. 114.

Tuberculin in the Treatment of Lupus.—Dott. Michele Brocchieri has made an exhaustive study of the tuberculins. Of especial interest are his conclusions in regard to tuberculin T. R. in the above disease. They are: 1. It acts without producing marked disturbances. 2. It resolves the infiltrations of lupus. 3. To determine accurately all that it can accomplish a year is necessary. 4. It limits the diffusions of the process, as if immunizing the surrounding parts. In the instances reported tuberculin has failed, while the use of tuberculin T. R. was successful.—*Il Policlinico*, 1898, No. 21, p. 489.

Potassium Iodide in the Treatment of Submucous Fibroids.—Dott. N. Marini has obtained satisfactory results by injecting into the uterine cavity a 10 per cent. solution of this substance in sterilized water or glycerin, and following with gentle massage of the uterus for five minutes. The hemorrhage ceases, the tumor diminishes in size, the pain lessens, and the general condition improves.—*Gazetta degli Ospedali v della Cliniche*, 1898, No. 142, p. 1503.

GYNECOLOGY.

UNDER THE CHARGE OF

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Senile Changes in the Fallopian Tubes.—SCHNAPER (*Centralblatt für Gynäkologie*, 1898, No. 44) describes the histological changes in twenty specimens removed from women whose ages ranged from forty-seven to ninety years. The ciliated columnar epithelium seen in the tubes of women before the climacteric gradually disappears, being ultimately replaced by cells of an endothelial type, which are eventually cast off, forming collections at the ends of the tubes and between the mucous folds. The mucosa is invaded by young connective tissue, while outgrowths resembling granulation tissue are seen at the spots where the epithelium is absent. Adjacent outgrowths may be connected by processes of connective tissue, forming closed cavities like alveoli, which on superficial inspection might be mistaken for glands. Through an increase in these adjacent processes the folds in the mucosa may be obliterated, the connective tissue becoming firm and hard.

The writer compares the condition to senile colpitis, since in both there is a gradual loss of the superficial epithelium, succeeded by a development of connective tissue, leading to narrowing or even to complete closure of the canal.

The muscular layers undergo atrophy until, in some cases, only islands of muscle tissue remain, the wall of the tube being more or less diminished in thickness. The adventitia of the vessels undergo similar changes, with consequent contraction of their lumina.

Results of Treatment with Ovarian Extract.—SEELIGMANN (*Allgem. med. Centralzeitung*, 1898, No. 3) reports fifteen cases treated by extract of the ovaries of sheep and pigs. He divides these into two classes, those in which the ovaries had been removed and those in which various disturbances attended diminished ovarian activity, both in young women and in patients at the climacteric.

The writer decides that the remedy has a decidedly beneficial action not only upon typical climacteric phenomena, but also upon the psychical depression and constitutional affection (such as gout and psoriasis), which, after long remaining latent, develop at the time of the menopause. In three cases of Basedow's disease the effect was quite marked. From chemical analysis of human ovaries he is led to the conclusion that it is not improbable that an iodine compound, like iodothyrin, may be isolated from the ovary.

Vaginal Cysts.—STOKES (*Johns Hopkins Hospital Reports*, 1898, Nos. 1 and 2) divides cyst of the vagina into three classes, viz., inclusion-cysts, those developing from embryonal tissue, and retention-cysts of glandular origin.

The first variety are of traumatic origin, due to the inclusion of islands of undenuded mucous membrane during plastic operations. They are small, globular, and contain a thick fluid filled with cast-off epithelial cells. They are seldom of any clinical interest. Embryonal cysts, which develop from the Wolffian ducts, are usually lateral in their situation, of an elliptical shape, and may reach a large size, giving rise to well-marked pressure-symptoms, dyspareunia, or even dystocia. Their contents are watery, with only a few cells, their walls being quite thin and semi-transparent. Retention-cysts develop from occluded glands, their walls consisting of gland-tissue, with an inner lining of ciliated columnar epithelium, which may lose the cilia and become flattened as the result of pressure. They contain a clear fluid in which are a few cells. Enucleation of the entire cyst is desirable whenever possible.

Dermoids of the Pelvic Connective Tissue.—QUERVAIN (*Archiv für klin. Chirurgie*, Band lvii., Heft 1) describes a retro-rectal dermoid cyst in a man, which for several years had given rise to severe vesical symptoms. It was drawn upward, sutured in the abdominal wound, drained, and later removed.

Only fifteen similar cases have been reported, all in women. They may be divided into two classes, viz., dermoids beneath the levator ani (between the rectum and the coccyx), and those above the levator, the latter being situated in the retro-rectal connective tissue, in the subserous tissue between the peritoneum of Douglas's pouch and the levator, or in the broad ligaments. The symptoms are due to pressure on adjacent organs and vessels. Those in front of the rectum must be distinguished from tumors in the cul-de-sac; dermoids behind the rectum may be mistaken for cold abscesses, serous or echinococcus cysts, explorative puncture being often the only means of establishing the diagnosis, although this procedure is not free from danger. It is better to operate as soon as the character of the neoplasm is recognized. Incision and drainage are recommended only when the tumor is first discovered during labor, and it should be extirpated as soon as possible after delivery.

The method of operation depends upon the situation of the dermoid; if it extends downward, perineotomy is indicated; if it is high up, the parasacral incision is better. If the tumor is abdominal, either of these methods may be combined with the extraperitoneal abdominal.

Appendicitis Simulating Neoplasms.—LEGUEN and BEAUSSENAT (*Revue de Gynécol. et de Chirurgie Abdom.*, 1898, No. 2) call attention to anomalous cases of appendicitis which may be mistaken for neoplasms in the iliac fossa. In these a hard tumor develops slowly, with progressive emaciation and cachexia. After a long period the mass becomes softer, evidences of suppuration appear, and on making an incision pus is evacuated, the tumor then disappearing. Eight cases are reported, with references to others in literature.

Transplantation of Ovaries.—ARENDT (*Centralblatt für Gynäkologie*, 1898, No. 41) reviews the experiments of Knauer and Grigorieff, which apparently showed that ovaries transplanted upon the broad ligaments preserved their full functional activity, as shown by the subsequent occurrence of pregnancy in four cases. With the technique which they adopted he argues that it was impossible to avoid leaving portions of the ovary in the stump.

In his own experiments (fifteen in number) he not only transplanted ovaries upon the broad ligaments in the same animal, but from one rabbit to another and from a rabbit to a cat.

The greatest care was employed to remove both ovaries entire, and that this was done was proved by subsequent atrophy of the genitals. On killing the rabbits within three months after operation the transplanted ovaries, as well as the uterus and tubes, were always found to be atrophied.

Ligation of the Uterine Arteries.—MANGIN (*La Gynécologie*, October 15, 1898) reports fourteen cases, from which he makes the following deductions: 1. Ligation of the uterine arteries is a simple operation, devoid of danger, and can be performed without anæsthesia. 2. It is especially indicated in cases of obstinate menorrhagia which resist medicinal treatment and curettement. 3. After ligation of the arteries hemorrhage nearly always ceases, and fibroids often undergo atrophy, especially when these are situated in the lower uterine segment. 4. The only contraindication to the operation is disease of the adnexa.

Smooth Muscle-fibres in the Broad Ligaments.—BLUMBERG and HEYMANN (*Archiv für Anat. und Physiologie; Centralblatt für Gynäkologie*, 1898, No. 46) describe the arrangement of smooth muscle-fibres in the broad ligaments of the fœtus in man and mammals as found in extended observations. They state that in the embryo these muscular bands assist in the descent of the ovaries by fixing these organs during the growth of the body. After birth they assist in supporting the genital organs. The round ligaments are actively concerned in keeping the uterus in its normal position. The infundibulo-pelvic and infundibulo-ovarian ligaments support the ovary and tube in common, the ovarian ligament the ovary alone; the latter also insures the entrance of the ovum into the tubes.

Primary Carcinoma of the Fallopian Tube.—DORAN (*Transactions London Obstetrical Society*, 1898) has collected all the published cases—twenty-three in number—in twenty of which carcinoma developed in a tube which presented no other evidences of disease. In three cases the disease probably extended to the ostium from an adherent ovarian cyst that had undergone malignant degeneration. One patient was free from recurrence seven years after operation, four being alive from one to one and one-half years after, while all the rest died within a year after extirpation of the affected tube.

The Condition of the Tubes During Menstruation.—BOND (*British Medical Journal*, June 4, 1898) found a bloody fluid in five healthy Fallopian tubes removed during menstruation, which showed, under the microscope, red and white blood-corpuscles and epithelial cells in various stages of mucoid degeneration. Sections through the uterine ends of the tubes were marked by thickening of the folds of mucosa with round-cell infiltration, though without exfoliation of the epithelial lining. In a case in which menstruation had ceased twenty-four hours before, the uterus contained bloody mucus, while none was present in the tube—a fact which seems to prove that menstruation begins in the tubes.

Bond inferred from experiments on animals that the escape of blood into the tubes is a true menstrual flow and not the result of ordinary venous obstruction. In cases of hydrosalpinx the increased pressure may prevent the usual monthly hemorrhage.

Torsion of the Fallopian Tube.—LEGNEU and CHABRY (*Revue de Gyn. et de Chir*, 1898, Nos. 1 and 2) regard this as a rare condition, only three authentic cases having been reported by Sutton, Delbet, and Hartmann and Reymond—all hydrosalpinx. The present writers describe a fourth case, in which the tubal enlargement was a large hæmatosalpinx. In this instance the tube alone was twisted around its long axis, the ovary remaining in its normal position. The cause of the torsion is not clear; it causes a complete occlusion of the lumen of the tube.

Fibroma of the Tube.—JACOBS (*Revue Internat. de Méd. et de Chir.*, 1898, No. 8) adds another case of true fibromyoma of the Fallopian tube to the six already reported. The growth was as large as an orange, submucous, and sprang from the middle third of the tube, the lumen of which was greater than normal and the distal end hypertrophied. Sections showed that the tumor developed from the muscular layer.

PARET (*Thèse de Paris;* abstract in *Centralblatt für Gynäkologie*, 1898, No. 46) states that fibromata of the tube are quite rare, and may undergo torsion of their pedicles with the same results as in the case of ovarian neoplasms.

Electricity in the Treatment of Anal Fissure.—DOMNER (*Journ. de méd. de Bruxelles*, 1898, No. 3) speaks highly of the use of the galvanic current in cases of anal fissure with hemorrhoids. One electrode is inserted beyond the sphincter, and the sitting is not prolonged beyond five minutes, from two to four applications being sufficient to cure old cases which have resisted the ordinary methods of treatment. The dosage is not given.

Hydrastine Hydrochlorate in Uterine Hemorrhage.—ROUSACK (*American Medical and Surgical Bulletin*, 1898, No. 3) highly recommends this alkaloid in the treatment of menorrhagia as well as of hemorrhages following abortion and labor at term. Excellent results were obtained in cases of menorrhagia associated with uterine displacement and disease of the adnexa. In one case of hemorrhage during pregnancy the bleeding was stopped and the patient went on to full term. Hemorrhages due to the presence of fibroid and malignant growths are not affected by the drug.

When large doses were administered to animals a cumulative effect was observed, shown by increased irritation followed by paralysis. Therapeutically, the daily dosage varies from one and one-half to two grains.

Adenomyoma of the Uterus.—IVANOFF'S inaugural thesis upon this subject (*La Gynécologie*, December 15, 1898) is based upon an examination of seventy-seven fibromyomata of the uterus, the majority of which were of the subserous variety. He was able to find glandular elements in only a single case, hence he concludes that uterine adenomyoma is very rare. He does not believe that embryonic remains which have been present for many years in the uterus can suddenly develop into a fibro-muscular neoplasm.

In the specimen examined a zone of irritation was present around the epithelial tubes and cystic cavities, as shown by dilatation of the vessels and round-cell infiltration, the same as in cases of localized obstruction of the circulation.

Influence of Pregnancy on Ovarian Cysts.—GOTTSCHALK treats of this subject in a clinical lecture (*Frauenarzt*, November, 1898) based on the following case: A patient, aged forty years, had an ovarian cyst which two surgeons had declined to remove. She passed through pregnancy and labor normally, but on the second day after delivery developed symptoms of peritonitis, which subsided in the course of a fortnight. Nine weeks later she had a more severe attack, and cœliotomy was performed successfully. The cyst was firmly adherent to the intestines, the pedicle was twisted twice around its axis, and the sac was filled with pus and foul-smelling gas. A pelvic abscess further complicated the case. Pure cultures of the colon bacillus were obtained from the cyst-contents.

The writer's deductions are that extensive adhesions may develop during pregnancy as well as after delivery. Torsion of the pedicle may follow the emptying of the gravid uterus in consequence of the sudden change in the intra-abdominal pressure. Infection of the cyst during the puerperium is well known, Zetter having reported twenty-one cases.

Spontaneous Separation of Uterine Fibroid.—MADLENER (*Monatschrift für Geb. u. Gyn.*, December, 1898) reports a case of ovariotomy in which a fibromyomatous tumor the size of a walnut was found attached to the abdominal end of the tube and the broad ligament by long, thin adhesions. Three similar subperitoneal growths were seen on the uterus. The tumor was partially calcified. It was evident that it had been a subperitoneal fibroid that had become adherent to the tube and broad ligament, and as the latter was drawn outward by the growth of the cystoma the fibroid was detached from the uterus. Eleven similar cases have been reported.

Removal of the Other Ovary in Ovariotomy.—THEILHABER (*Ibid.*) lays down the following rules: If the opposite ovary contains only a few retention-cysts it may be left after puncturing or resecting the cysts. If the cyst is of the true papillomatous variety the other ovary should always be removed, even if it appears to be perfectly healthy, since experience has shown that it often undergoes papillomatous degeneration afterward. This does not refer to cases in which small excrescences are found in the inner walls of retention or parovarian cysts. Commencing adenomatous degeneration of the opposite ovary may be suspected if the albuginea is much thickened and the organ is almost entirely transformed into large cysts with thick walls. In the case of young women a suspicious ovary may be split open, its interior examined, and, if healthy, may be sutured with catgut. If one ovary is affected with carcinoma, sarcoma, or endothelioma, the opposite one should always be extirpated.

OBSTETRICS.

UNDER THE CHARGE OF

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The Treatment of Intraligamentary Pregnancy by Vaginal Incision.—At a recent meeting of the Obstetrical Society of London, DONALD (*British Medical Journal,* January 14, 1899) read a paper on a case of ectopic gestation at the seventh month in which the fœtus was extracted by vaginal incision. When admitted to the hospital the abdomen was enlarged by a tumor reaching four inches above the umbilicus. A large souffle was distinctly heard. The cervix was close to the pubes, and the uterus was somewhat enlarged. The post-vaginal fornix was bulged by a hard mass which almost filled the brim. This was the fœtal head, and its sutures could be outlined.

Abdominal section was performed and the placenta found in such a position that its removal was not safe. Accordingly the wound was closed and the child delivered by incision through the vagina and by crushing the head. The sac was packed through the vagina with iodoform gauze. On the fourth day this gauze was removed, when alarming hemorrhage occurred, which was checked with difficulty. The placenta was some weeks in coming away, but was finally delivered, the patient making a complete recovery.

In discussion, Galabin and Cullingworth spoke in favor of the combined operation, first making an abdominal incision to confirm the diagnosis, and then removing the embryo through the vagina. Galabin had removed the placenta in one case through the vaginal incision three days after the operation, and the patient rapidly recovered.

Donald ascribed the source of the hemorrhage to a placental vessel, which was disturbed when the gauze was removed.

The Serum Treatment of Puerperal Septicæmia.—GRIMSDALE (*British Medical Journal,* January 14, 1899) reports the case of a patient who developed streptococcus infection forty-eight hours after labor. Although the uterus was promptly cleansed, she rapidly developed serious symptoms. On the ninth day streptococci were found in the blood, and serum injections, two in number, were made. The patient's temperature fell to normal for twenty-four hours, and then rose gradually. The germs, however, were still found in the blood. Injections were given consecutively for fifteen days until the germs disappeared, when they were stopped. At this time the temperature was 101° F., but gradually fell, and the patient was discharged cured. No uterine treatment was employed, and no drug except quinine. Urticaria and severe pains in the limbs occurred, which disappeared in two weeks.

Cæsarean Section in the Philippines.—In the *British Medical Journal*, January 14, 1899, Lobti gives some interesting information regarding obstetric practice in the Phillipine Islands. There is a religious prejudice against craniotomy, and Cæsarean section is often done after the death of the mother. Some remarkable statements are made as to the survival of children extracted several hours after the mother's death.

Dermoid Cyst Complicating Pregnancy Removed Through the Vagina.—In the *Transactions of the Obstetrical Society of London*, 1898, vol. xl., Part iii., Routh reports the case of a primipara, four months pregnant, who had an impacted dermoid cyst in the pelvis. The tumor was removed by opening the posterior wall of the vagina with a crucial incision, and separating the peritoneum by the fingers, drawing it down, and opening it. This gave the operator a tube of peritoneum through which to work. The cyst was then seized and a few adhesions separated. It was punctured, liquid fat escaping. It was then drawn down and found to have a short pedicle which could not be reached until the uterus was also depressed. A ligature was applied and a pedicle made. The patient recovered well and was just about to go home when her temperature rose to 106°. This was followed by abortion, from which she gradually recovered. There was no evidence of sepsis in this case.

Acute Bedsore Following Parturition.—Blacker reports, in the *Transactions of the Obstetrical Society of London*, 1898, vol. xl., Part iii., the case of a multipara, aged twenty-six years, who had a perfectly normal labor until the end of the second stage. There was considerable hemorrhage after birth, and the placenta was removed by hand. During the labor, to relieve the pains, the lower part of the back was supported by the knee of an attendant for about an hour. The skin over the sacrum was red.

On the first day after confinement the skin over the sacrum was found to be bruised over an area three inches by two, which was surrounded by small vesicles filled with watery fluid. On the second day, a slough seemed forming and the skin over the left trochanter was also reddened. On the third day a small sinus formed, leading down to the sacrum, and the whole of the bruised area sloughed in the next few days.

When the patient was admitted to the hospital the slough was offensive, and the greater part of it was readily removed. There was a purulent discharge from the cervix, but not other evidence of pelvic disease. There was no evidence of injury to the vagina or cervix and no exudate in the pelvis. There was no paralysis or rigidity of the lower limbs and no loss of sensation. In two months' time the patient made a good recovery. No symptoms of nervous disease or of specific infection could at any time be observed.

A Simple Method for Securing Asepsis in Tamponing the Uterus.—In the *Centralblatt f. Gynäkologie*, 1898, No. 36, Schwarzenbach calls attention to the difficulty experienced in avoiding the contamination of gauze in tamponing the puerperal uterus. A considerable portion of such cases show rise of temperature during recovery, from infection obtained in this way. To avoid this, Schwarzenbach has devised a metal speculum, 10 cm. long (3.9 inches) and funnel-shaped. This speculum, perfectly smooth, can be sterilized by boiling and can be readily introduced. With this speculum he uses two tenaculum forceps, each of which has upon each branch a small hook, the point of the hook looking toward the distal end of the forceps. When the speculum is introduced, the anterior and posterior lips of the cervix are grasped by the tenacula forceps and drawn down so far that the hooks upon the forceps catch upon the rim of the speculum. In this way the womb is retained in position. The gauze can then be introduced through the speculum without coming in contact with the patient's tissues until it reaches the uterus.

Symphysiotomy Followed by Urethral Fistula.—CARR reports, in the *American Journal of Obstetrics*, October, 1898, two cases of symphysiotomy. The second was that of a white primipara in very delicate health, who had a long and difficult labor. Forceps was tried without success. When operated upon the patient was in a very critical state. Symphysiotomy was readily done, and a dead child delivered. A silk suture was placed in the pubic ligament and the bones drawn together. The patient suffered after operation from severe capillary bronchitis.

On the twelfth day a small opening appeared in the scar, through which urine began to discharge, and this opening finally became as large as the finger-tip. The sinus seemed to open into the urethra near the neck of the bladder. The silk ligature in the anterior pubic ligament was discharged through the sinus. This fistula finally closed in about four weeks. The patient's further recovery was complicated by phlegmasia dolens. At the end of seven weeks the bones were firmly united, and by the tenth week the patient could walk.

Two Cases of Ectopic Gestation Near Term.—In the *Centralblatt f. Gynäkologie*, 1898, No. 37, WARSAWSKI reports, from the clinic at Warsaw, two cases of ectopic gestation upon whom operation was performed.

The first was that of a woman aged thirty-three, married for thirteen years, who had never had a child. For the relief of dysmenorrhœa, dilatation and curetting of the uterus were performed. Shortly after, symptoms of pregnancy appeared and false labor came on, lasting at intervals for two weeks. There was hemorrhage for two days. After this, menstruation gradually returned. The patient was admitted to the hospital, and upon examination an ectopic pregnancy was found. The fœtus had perished, and the fœtal sac was evidently a rudimentary horn of a double uterus.

On abdominal section the diagnosis was confirmed, and the fœtal sac found in the left tube projecting into Douglas's pouch. It was impossible to separate the placenta without severe hemorrhage, and accordingly the membranes were stitched to the edges of the abdominal incision and the sac packed with gauze. The patient made a good recovery.

The second case was that of a woman who had previously had an abortion caused by a kick in the abdomen. After this abortion she again became pregnant and supposed herself in a normal condition. Fœtal movements, however, ceased. There was a bloody discharge, and the patient suffered from pain in the back and a feeling of weight in the abdomen. Operation had been proposed, but declined. On examination the uterus was found enlarged and empty. The fœtus had perished and the fœtal sac could be traced to the rudimentary horn of a double uterus. This diagnosis was confirmed by abdominal section and a macerated child was removed. The placenta was parchment-like and was separated without bleeding. The fœtal sac filled Douglas's pouch.

After removing the placenta the sac was packed with gauze and brought out at the lower end of the abdominal incision. The patient made a good recovery, portions of the fœtal appendages coming away gradually for some time.

Induction of Abortion by Nitrate of Silver.—In the *Prager medicinische Wochenschrift*, 1898, No. 45, PEARLSEE reports his results in the therapeutic induction of abortion by the use of nitrate of silver. He introduced a small portion of the solid nitrate within the uterus, allowing it to remain and dissolve there. He saw no bad results from the use of this method.

Diabetes Insipidus and Pregnancy.—VINAY (*Lyon Médical*, 1898, No. 48) reports two very interesting cases of diabetes in pregnant women.

The first was a neurotic subject, who, after intense emotion caused by fright, had polyuria. She became afterward pregnant, when this symptom lessened. She went to normal labor, and was apparently making a good recovery, when, upon the thirteenth day, she had double pulmonary embolus and died from cardiac complications on the twenty-ninth day after her delivery.

His second case was one in which diabetes began at the fourth month of pregnancy. The immediate cause was intense mental shock following the burning of a portion of the patient's dwelling. The patient lost weight very greatly during her pregnancy, but went to term, and was spontaneously delivered of a living child, which died two weeks after birth. After her delivery the patient apparently did well until five months had elapsed, when symptoms of pulmonary tubercle appeared, from which she died.

It is very interesting to note that in both these cases profound mental shock was the immediate cause of the diabetes. The recovery of one of the patients was interesting and an exception to the rule in these cases. Pronounced diabetes is very fatal to mother and child as well.

Autointoxication in a Pregnant Patient Followed by Fatal Vomiting.—In the *Semaine Médicale*, 1898, No. 57, BARTH reports the case of a young woman in the second month of pregnancy who developed fatal pernicious vomiting and also embolism of the femoral artery. She was tuberculous, and alcoholic and atheromatous.

On post-mortem examination the womb was normal in size, shape, and position. The liver, however, showed old and chronic lesions, tubercular in origin; the kidneys were in a condition of recent degeneration; the affected artery was atheromatous; the stomach was normal, and the brain was also normal. The case is an interesting example of the effects of autointoxication in producing pernicious vomiting.

Double Ovariotomy During Pregnancy.—In the *Prager medicinische Wochenschrift*, 1898, No. 48, FISCHEL reports a very interesting case in which a patient three months pregnant was found to have double ovarian tumor. She consented to operation, and the tumors, which were dermoid, were readily removed. She went to term and was delivered spontaneously of a living child. She made a good recovery.

This should strengthen the opinion of those who believe that ovarian tumors in pregnant women should be removed. It is interesting to note that 30 per cent. of ovarian tumors occurring in pregnant patients are dermoid.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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Morbid Growths of the Larynx.—DR. COLLINS reports from the clinic of the Polyclinic Hospital (*Philadelphia Polyclinic*, 1898, No. 37) a case of recurrent growth, presumptively papilloma, which disappeared under the influence of ten-grain doses of magnesium sulphate three times a day, without any other treatment.

Rare Cases of Laryngeal Polyps —DR. LOUIS BAR, of Nice, reports (*Annales des Maladies de l'Oreille, du Larynx*, etc., September, 1898) cases of the following character: Intraglottic fibroma in a woman sixty-five years of age; fibroma of the right vocal band in a woman thirty-five years of age; papilloma of the interarytenoid region in an adult male, with subsequent history indicating possible transformation into epithelioma; cysts of the vocal bands in a female twenty-five years of age; fibromyxoma of the left vocal band in a man thirty-two years of age, and lipoma of the subglottic region in a woman twenty-five years of age.

Thyroidectomy.—DR. WM. KRUSEN reports (*Therapeutic Gazette*, August 15, 1898) a case of thyroidectomy in a German housekeeper, fifty-three years of age. The hypertrophied gland, about the size of an orange, on the right side of the trachea, extending laterally beneath the sternomastoid muscle and downward into the supraclavicular space, was freely movable beneath the skin, and apparently semicystic in character. The operation was successfully performed under oxygenated chloroform, some difficulty occurring by interference of the respiration by the tugging of the trachea during enucleation. The patient left the hospital on the eighteenth day, and the subsequent history has been satisfactory.

[In a successful thyroidectomy, under chloroform anæsthesia, recently performed by the compiler for a round-celled sarcoma occupying the same relative position as in the case reported above, there was a sudden change of voice to a higher pitch, occurring upon the second day after the operation, although the recurrent laryngeal nerve was seen to be intact before the wound was closed. After convalescence the vocal band of the side operated upon was found immobile in the median position, there having been, in all probability, some adhesive inclusion of the recurrent laryngeal nerve in the cicatrization of the tract of the wound.]

Chronic Abscess of the Soft Palate.—Dr. Georges Laurens reports (*Annales des Maladies de l'Oreille, du Larynx*, etc., September, 1898) a case in a man forty-eight years of age. He was subject every seven or eight months to sudden access of extremely fetid odor in the mouth, with the expulsion of yellowish-white pultaceous matters, which were horribly fetid. [These were evidently decomposed excretions such as are frequently expelled from the diseased tonsils.] These phenomena would be produced several times a day for forty-eight hours, when they would cease. They were increased by compressing the submaxillary region. On one of these occasions, when examined by Dr. Laurens, a probe was passed into the supratonsillar fossa and penetrated into the tissues of the soft palate in two directions—one upward, the other downward and forward. A sort of a pre-tonsillar recess was thus defined between the anterior pillar and the tonsil, which latter were adherent one to the other. The probing gave exit to caseous pus of a most disgusting odor. On examination with a small mirror the pocket was seen to be normal in color and free from fungosities. Pressure externally at the region of the angle of the jaw gave exit to caseified pus in the neighborhood of the supratonsillar angle. The treatment consisted in making a free opening of the purulent region, with excision, scraping, and cauterization of the morbid tissues.

The author concurs in the opinion of de Lermoyez and Cartaz in considering these chronic abscesses as relics of profuse inflammations which have produced diverticula and fistulous passages.

Foreign Body in the Œsophagus.—Dr. Charles A. Powers, of Denver, Col., reports (*Boston Medical and Surgical Journal*, July 7, 1898) two interesting cases of successful external œsophagotomy for impacted foreign body. The first was for a triangular fragment of bone in a man, aged fifty years; the other for a wheel from a toy railroad car in a male infant, aged two and one-half years. In the latter case the diagnosis had been confirmed by skiagraphy; the operation was performed on the twenty-second day after the accident.

Deviations of the Nasal Septum.—A new and ingenious operation is described by Dr. E. B. Gleason (*Philadelphia Polyclinic*, 1898, No. 34). It consists in sawing a U-shaped flap around the deviation, base upward, then pushing that flap upward into the unobstructed passage so as to break the resiliency of the cartilage, and then allowing it to drop down over the opening like a trap-door. It is stated that no support by pins or tubes has been required in fully 8 per cent. of the cases.

[In one of Dr. Gleason's patients seen by the compiler the result was very satisfactory.]

Lymphoid Growths—The Influence of Adenoids upon the Development of Certain Lesions of the Skeleton—M. BILHAUT has proved (*Gaz. Hebd. de Méd. et de Chirurgie*, 1898, No. 52) that voluminous adenoids are very frequently found in the bodies of scoliotic subjects, and he believes that it is proper to consider that there is a relation of cause and effect between the two morbid conditions, especially because, in some cases of commencing deformation without definitive lesions of the skeleton, the removal of adenoids is alone sufficient to produce a cure. In more serious cases the removal of the adenoids should constitute the first therapeutic act, and then the effect of the orthopedic corset is incomparably more satisfactory than if it is applied without attention to the rhinopharynx.

M. Bilhaut also believes that the hour-glass deformity of the thorax described by Dupuytren is the result of trophic changes due to microbic infection of primitive adenoid localization.

Practical Point upon the Action of Cocaine.—PROF. SCHIFFERS, in a contribution upon the study of the action of cocaine (*Annales des Maladies de l'Oreille, du Larynx, etc.*, February, 1899), refers to the fact of the difference of susceptibility in different patients and of the same patient on different occasions. He finds that this is due sometimes to acidity of the solution itself, sometimes to the acidity of the mucous membrane upon which it is applied, and sometimes to acidity of the patient's stomach.

In any of these conditions the addition of an alkali will neutralize the acidity and will enable the application of cocaine to be effective in much smaller doses, sometimes amounting to one-half the strength. In cases of dyspeptics he would give alkaline waters in large doses. He would use only extemporaneous solutions of cocaine, and if these were acid he would neutralize them with a few drops of sodium carbonate or sodium bicarbonate.

Adenoma of the Soft Palate.—DR. W. L. BULLARD, of Columbus, Ga., reports (*New York Medical Journal*, December 10, 1898) a case of adenoma of the soft palate in a mulatto woman, aged twenty-three years, who had noticed the growth for some two years. At the time of consultation it was the size of a guinea-egg, and rendered sleep difficult on account of the impairment of respiration. It also troubled her in speaking and in swallowing. It was readily removed by enucleation, after incision into the mucous membrane, under chloroform. The breathing became so stertorous during the operation, on account of the paralysis of the palate, that it seemed alarming, and it was deemed advisable to introduce a catheter in the throat.

[If the compiler's memory serves him correctly, the majority of cases of adenoma of the soft palate occur in females.]

A Case of Pure Nasal Aprosexia without any Auditory Complications.—DR. GUYE, of Amsterdam, reports (*Annales des Maladies de l'Oreille, du Larynx, etc.*, February, 1899) the case. Prof. Guye proposed the term of nasal aprosexia to impaired cerebral activity due to nasal trouble and characterized by impossibility to fix the attention upon a determinate object, and attributed it to restraint in the escape of the cerebral lymph by the lymphatic passages of the nasal mucous membrane. Titeff and others claim that the term auditive aprosexia is more appropriate, because the malady is associated with impaired hearing. The case reported with normal acute hearing proves the contrary.

A boy, aged eight years, had always slept with his mouth open, and was unable to learn anything at school. Not the slightest deafness had been observed either at home or at school. He had had an intermittent discharge from the right ear, and showed an old, dry perforation of the tympanic membrane; but he heard the watch with this ear better than with the other, while the whispered voice was heard at normal distance from both ears. After the operation for adenoid vegetations and consecutive intranasal treatment the nasal respiration became normal, and intelligence developed rapidly. He commenced to study better at school, and his memory improved.

Tonsillar Calculus.—W. G. A. Robertson describes (*British Medical Journal*, January 7, 1899; *Philadelphia Medical Journal*, January 28, 1899) a case of a patient who had suffered from repeated attacks of tonsillitis, and in whom there was no history of a gouty tendency. The calculus, 42 x 36 millimetres in size and weighing almost an ounce, escaped from its bed in a fit of violent coughing.

Acute Suppurative Tonsillitis, with Convulsions.—Roger K. Hamilton reports (*British Medical Journal*, January 7, 1899; *Philadelphia Medical Journal*, January 28, 1899) a case of abruptly developing acute suppurative tonsillitis in a girl, aged seven years, and in which in less than twelve hours from its onset the right tonsil opened spontaneously and discharged pus. During the following day the child was restless and drowsy, and in the latter part of the day had a severe and distinct convulsive attack, lasting about five minutes.

Differential Diagnosis of Pharyngeal Syphilitic Lesions and Diphtheria.—Dr. Lewis S. Somers contributes a paper upon this subject (*Philadelphia Medical Journal*, January 28, 1899) and communicates a case of syphilitic mucous patches on both tonsils and the adjacent portion of the uvula of a man, aged forty-three years, illustrating a close resemblance to diphtheria.

He reports another case of tonsillar and pharyngeal ulcer resulting from the breaking down of a gummatous tumor of tertiary syphilis and simulating diphtheria, but to a less extent than in the previously recorded case.

Parasyphilitic Affections of the Larynx.—Prof. Massei, of Naples, contributes to the Jubilee number of the *Annales des Maladies de l'Oreille, du Larynx, etc.*, February, 1899, an admirable little article upon this subject. He alludes to a variety of affections which occur anatomically as the result of syphilitic lesions, without possessing in themselves any syphilitic elements and which are not to be treated by antisyphilitic remedies, but chiefly by surgical procedures when applicable; otherwise they often remain irremediable.

New Electric Snare for the Ablation of Adenoid Vegetations.—Dr. J. Garel (*Annales des Maladies de l'Oreille, du Larynx, etc.*, February, 1899) describes and extols a snare recently devised by him for the removal of lymphoid hypertrophies and other growths from the vault of the pharynx.

It is a guarded snare, shaped on the model of Gottstein's curette, and, of course, acts automatically once the instrument is placed in position. There is no hemorrhage other than that produced by the contact of the instrument against the tissues.

This instrument can hardly ever be used upon children under nine or ten years of age.

Paralysis of the Inferior Laryngeal Nerve.—In the Physiological Section of the *Archiv für Anatomie und Physiologie*, 1899, PROF. H. KRAUSE, of Berlin, details some recent experiments upon animals which support Grossman's theory that the median position of the vocal bands in paralysis of this nerve is due entirely to the unimpaired function of the cricothyroid muscle.

HYGIENE AND PUBLIC HEALTH.

UNDER THE CHARGE OF

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Food Poisoning.—An outbreak of meat poisoning due to imperfectly cooked veal pies is reported in detail by DRS. J. B. WILKINSON and HAROLD ASHTON, and has been the subject of considerable investigation and speculation by DR. HERBERT E. DURHAM (*Public Health*, January, 1899, and *British Medical Journal*, December 17, 1898). All the cases, somewhat over fifty in number, presented very similar symptoms, the chief of which were severe and uncontrollable vomiting and diarrhœa, accompanied at first by shivering, and followed by collapse. In some there were violent abdominal pains, and in several the abdomen was swollen and tender. Many had severe pains in the back. The symptoms began in from five to fourteen hours after eating, and, as a rule, were severe from the start. The motions were first grass-green, then dark green, and highly offensive. The severity of the diarrhœa increased on the second day; one patient was purged forty or more times in a single day. In very few cases the dejecta contained a little blood. In the worst cases the patients became semi-comatose, restless, and delirious in the course of a few hours. Occasionally there were disturbances of vision, which lasted until the temperature, which ranged from 100° in the mildest to 104.5° in the severest cases, became normal. The pulse was very rapid, weak, and dicrotic. In many cases the patient was markedly cyanotic and had some difficulty in breathing. Some had cramps, and nearly all had muscular pain and stiffness. In very many cases herpes appeared about the lips on the third to the sixth day, and some had a rash, followed by desquamation. Convalescence in the severe cases was very prolonged; some were still weak, even after three and a half months. Four cases terminated fatally, and in two of these autopsies were secured. The brain surface showed slight congestion; the small intestines showed congested patches, which became larger and more numerous lower down, and did not correspond with Peyer's patches. The whole lower third was highly congested and contained blood and bloody mucus. The large intestine also was highly congested, and contained some yellow, diarrhœic fluid. Otherwise the organs of the body were found to be in a fairly healthy condition.

Investigation of the cause of the outbreak yielded the following facts: On Tuesday, July 26th, an apparently healthy calf was slaughtered, and two days later the forequarter and breast were delivered to a baker, who made the meat into the pies which were shown to be the cuuse of the outbreak. Other portions of the animal were sold to others who made pies which caused no trouble. A portion of a knuckle end, which was still in the possession of the butcher when the investigation was begun, was to all appearances perfectly good meat. The baker to whom the trouble was traced made, on the day he received the meat, 160 veal pies and 108 pork pies. The pastry was the same for the entire lot, and both kinds were treated to the same lot of jelly, which was made by boiling the veal bones with two pigs'-feet in four quarts of water. Inasmuch as the pork pies caused no disturbance of any kind, no responsibility could be attached to the pastry or to the jelly. The veal pies were baked in not less than three nor more than five batches, hence the batches would have included about thirty-two, forty, or fifty-three pies. The time occupied in baking each batch was said to be about twenty minutes. The number of persons affected was somewhat over fifty; and as in some cases single pies were shared by two, three, and four persons, it is obvious that less than fifty pies produced all the trouble. Since no other parts of the animal produced any sickness, there can be no doubt that the contamination of the meat occurred after the sale and delivery. According to the findings of Dr. Durham, based on a study of the blood of a number of the patients as to the behavior of the serum when tested for clumping properties with various micro-organisms, with controls of serum from normal persons, the outbreak was due to the bacillus enteritidis. This limitation of the inquiry was necessitated by the fact that it was impossible to secure either one of the pies or part of one or any of the first vomitings. The conclusion arrived at, strengthened by the fact that all four fatal cases were from pies which were two or more days old when eaten, which period allowed enormous multiplication, makes most probable the further conclusion that one whole batch was so insufficiently cooked as to preclude the killing of the organisms, which, according to Basenau, cannot survive exposure for one minute to a temperature of 70° C.

Another outbreak, which is likewise to be attributed to insufficient cooking of infected material, is recorded by Dr. F. W. Andrewes (*The Lancet*, January 7, 1899). In this the offending food was rice pudding, which caused eighty-six cases of diarrhœa in a single night in St. Bartholomew's Hospital, the infecting agent being *bacillus enteritidis sporogenes.* Three different outbreaks of diarrhœa have occurred within recent years in this institution: the first and second involved fifty-nine and 146 patients, respectively; the third (the one under consideration), eighty-six. In all three epidemics the great majority of attacks have been mild—merely abdominal pain followed by a few loose movements. In a few of the more severe cases the discharges have contained mucus and blood. On each of the three occasions there were instances of abdominal pain alone and a general tendency to looseness of the bowels. In the first two outbreaks no special article of food could be incriminated, but the third was shown by many facts and coincidences to be due undoubtedly and incontestably to rice pudding, and to nothing else. In the first outbreak Klein found in the patients' stools a peculiar spore-bearing anaërobic bacillus, which he named *bacillus enteritidis sporogenes,* which most nearly resembles *bacillus butyricus.* It is intensely virulent when inoculated subcutaneously in guinea-pigs, and recent milk-cultures are the most virulent. It is a common saprophyte, and is probably consumed habitually in milk, in which it is very commonly detected, with no deleterious results; yet under certain unknown circumstances it becomes highly pathogenic. It was found in the stools of all those affected in the second outbreak and in the milk supplied on the day previous. In the third outbreak stools were taken from three patients at random, and were found to contain the organism. Cultures made in milk heated to 80° C. proved to be highly virulent. Guinea-pigs inoculated in the groin at the end of forty-eight hours with 1 c.c. of whey died in less than two days—one in twenty-one hours. All showed intense hemorrhagic œdema and gangrene spreading over the abdomen and thorax, and in all the organism was found in the blood and in the spleen. It was not possible to obtain any of the milk, as it had been used up or thrown away; but a part of a pudding was found and examined. It was sour in smell and acid to litmus; it yielded bacilli, which, while not so intensely virulent as those found in the stools, were, nevertheless, undoubtedly the same organism. Tests in the kitchen showed that the temperature reached in the preliminary preparation of the materials of the pudding ranged from 70° to 85° C., and in the final baking from 90° to 98° C., which is insufficient for killing the spores of the organism, which are among the most resistant known and can withstand a temperature of 100° C. for a considerable time.

Effect of Cider on Microbes.—Since cider is often adulterated with water which may be contamintaed with sewage, and hence may contain the typhoid organism, M. BODIN (*Revue Scientifique,* December 17, 1898) has made some experiments to determine whether these can live and preserve their virulence in that beverage. Cultures of the bacilli were treated with cider, and at the end of twelve to eighteen hours all were found to have been killed. As the organism, according to Berthelot, can develop in media as acid as cider, the question arises whether the destructive agent is not the aldehyde, which is always to be detected in some amount in beers, wines, and cider.

Disinfectant Properties of Ordinary Soaps.—According to PROFESSOR A. SERAFINI (*Archiv für Hygiene,* xxxiii. p. 369), who has been making a study of the subject, soaps, whether hard or soft, possess a fairly high disinfectant power, which is not to be attributed either to the base or to the fatty acid, but to the resulting combination of the two. The free alkali content is ordinarily such that even in concentrated soap solutions it can exert no disinfecting action whatever. Since filtered and unfiltered soap solutions have the same power, it may be concluded that the disinfectant property resides alone in the soluble portions, and this property is naturally diminished by anything which tends to precipitate the soap from its solution. It is also influenced by temperature in two ways: first, by reason of the fact that disinfectants in general are more active at high temperature; and, second, that increase in temperature causes increased solubility. As the property is inherent in the salts of the fatty acids, anything which diminishes their relative amount, as foreign substances or high percentage of contained water, lessens the power of the soap to disinfect; hence the so-called rosin soaps which are very common in the market have proportionately less action the higher their percentage of salts of the rosin acids.

In the ordinary washing of clothes soaps can exert but little disinfection, because of the many factors which cause a diminution of their power, among which the hardness of the water is one of the most important. In general, if one is obliged by lack of other means, or on account of economy, to employ soap in the practice of disinfection, it is best to avoid soft soaps, since they contain a large amount of water, besides glycerin and all the impurities of the fats and alkali from which they are made—objections which do not apply in the same degree to hard soaps. One will do well to distrust the ordinary colored soaps, especially the green, yellow, and brown, which are more than likely to contain rosin. Those on which one may most safely depend are the hard white and marbled Marseilles, or castile soaps, since they contain no rosin and but little water. If soaps must be employed as disinfectants they should be used in concentrated solutions at a temperature of 30°–40° C., and the objects treated should be immersed a number of hours therein.

Tuberculous Meat.—According to the official returns of the Leipzig abattoir for 1897, 36.40 per cent. of the 27,191 cattle slaughtered were more or less tuberculous. Nearly half (48.09 per cent.) of the cows were affected, while but a fifth (20.49 per cent.) of the bullocks and heifers gave evidence of the disease. Notwithstanding the large number of infected animals, only 2.08 per cent. were totally condemned as food. Of those more or less infected but passed as fit for food—that is, 97.92 per cent., all but a very small number were allowed to be sold without any restrictions after the removal of the organs affected. The balance, 5.73 per cent., were first sterilized or sold as of second quality. Only eight sheep out of 49,559 were tuberculous. Of the swine, 132,062 in number, 2.78 per cent., and of the calves, 67,961 in number, 0.20 per cent., were more or less diseased.

Scarlet Fever in Swine.—The disease known as rothlauf in Germany, and rouget in France, is in England (and America ?) often called pig scarlatina, on account of the bright-red eruption on the skin; but incorrectly so, since the constant presence of lesions of the intestine show it to be a disease *sui* *generis*, and more akin to typhoid. But BEHLE has reported a remarkable and, so far as we know, unprecedented instance of the participation of swine in an outbreak of scarlatina in Germany. He states that while the children at a number of farm-houses and cottages were suffering from scarlatina of a severe type, the pigs were attacked by a highly infectious and fatal fever, the symptoms and post-mortem appearances of which were identical with those of scarlatina in man, viz., angina, erythema, followed, in those that recovered, by desquamation, œdema of the extremities, albuminuria, uræmia, and acute nephritis. A healthy animal at a house where none of the family had been attacked, having been inoculated with the blood of a child suffering from scarlet fever, died at the end of a week with symptoms and lesions indistinguishable from those of the human disease and from those of the pigs that had presumably contracted it from the inhabitants, though whether through actual contact or, as is highly probable under the conditions of village life, through the ingestion of their excreta, we have no means of knowing.

[There is little doubt that cows are susceptible to scarlatina and that the disease may be reconveyed to man by the consumption of their milk, but owing to histological differences the external appearances are greatly modified. The susceptibility of any of the lower animals to diseases proper to man, as of rats to the plague and of cats to diphtheria, is of great interest not only from a purely scientific stand-point, and as bearing on the propagation of the infection, but as affording opportunities of studying the etiology and prophylaxis of the disease *in corpore vili.* This can be done most satisfactorily when the character of the skin, etc., permits of the morbid processes taking the same appearances, which is rarely the case. One cannot reasonably expect a finely punctated erythema on the hairy hide of the cow, and it is impossible to imagine the eruptions of scarlatina or the pustules of smallpox on that of an elephant or rhinoceros, though one may conceive of these animals being susceptible to the virus.—E. F. W.]

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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Scarlet Fever.—PEARCE ("Scarlet Fever: Its Pathology, Histology, and Bacteriology," *Medical and Surgical Reports, Boston City Hospital*, 1899) has made thorough gross, histological, and bacteriological examinations in twenty-one cases of scarlet fever in which a complete post-mortem examination was possible. Nothing was observed which would indicate the etiology of the disease.

The only constant gross change found was a hyperplasia of the lymphoid tissue in every part of the body. This hyperplasia was found not only in the large subcutaneous and mesenteric lymph-nodes, but also in the small lymph-nodules of the mucous membranes. It was particularly prominent in the Peyer's patches and solitary lymph-nodules of the intestine.

A false membrane on the tonsil was seen in a few cases. This membrane was always due to the streptococcus.

The micro-organisms producing secondary inflammatory lesions were, in the order of their frequency, the streptococcus pyogenes, the staphylococcus pyogenes aureus, and the pneumococcus. The streptococcus was also found most frequently in the general infections and on the mucous membrane of the throat and nose.

The more important inflammatory complications observed were acute inflammation of the middle ear, with or without extension to the mastoid cells; suppuration of cervical lymph-nodes; acute pleuritis; inflammation of the antrum of Highmore. The less frequent complications were abscess of the lung; ulceration and abscess-formation of the upper respiratory tract; acute endocarditis; inflammation of the sphenoidal sinus, and metastatic abscesses of the kidney.

Of these inflammations the antrum of Highmore is the most interesting. It was found in three out of the four cases in which the accessory sinuses of the nose were examined by the Harke method. The most common complications were broncho-pneumonia and suppuration of the middle ear, each of which occurred in eight cases.

The histological report, which forms the bulk of the paper, is very complete. Thirty-two different organs and tissues were examined. The histological examination of the skin, tongue, and mucous membrane of the mouth and pharynx showed the changes in these tissues to be inflammatory rather than vasomotor. The most marked changes were seen from the fifth to the ninth days. The bloodvessels were congested, the lymphatics dilated, and the epithelial and subcutaneous tissues, particularly the former, infiltrated with large numbers of polymorphonuclear leucocytes. The changes were most marked in the tongue, particularly in the papillæ, a fact which explains the prominence of these bodies seen clinically.

The lesions in the gastro-intestinal tract consisted in degenerative changes in the epithelium and of proliferative and degenerative processes in the lymph-nodules similar to those in lymphoid tissue elsewhere.

The changes in the heart-muscle were fatty degeneration and fragmentation.

In the liver two forms of focal lesions occurred. One was due to accumulations of phagocytic cells in the capillaries, leading to occlusion of the vessels and to necrosis of the included liver-cells, and might occur in any part of the lobule. The other was due to a necrosis of liver-cells in the centres of the lobules, followed by an infiltration with leucocytes.

The changes in the spleen consisted of proliferation of the endothelial cells in the centres of the Malpighian bodies and of the endothelial cells lining the blood sinuses. In the lymph-nodes generally a similar proliferation was observed in the lymph-nodules and lymph-sinuses. These newly-formed cells were generally markedly phagocytic. There also occurred in the spleen and lymphoid tissue generally an abundant formation of plasma cells from lymphoid cells. In some cases large numbers of plasma and lymphoid cells were found in the veins of the spleen just beneath the endothelium.

From a study of the kidneys of these cases the writer concludes that acute interstitial nephritis is the most important early renal lesion of scarlet fever. It was well marked in four cases, dying late in the second or early in the third week of the disease. In four other cases slight interstitial changes were noted. No glomerular lesions were found. This may be explained by the fact that of the cases examined only one died after the sixteenth day.

The most marked cell change observed was the production of plasma cells in the spleen, lymph-nodes, and lymphoid tissue generally throughout the body. In certain cases these cells were present in large numbers in the circulation and in the tissues of the kidney and lung—a process analogous to the one mentioned by Councilman as occurring in diphtheria. A less frequent cell change was the production of phagocytic cells from the endothelium of lymphoid tissue generally and from the endothelium lining the lymph-sinuses of the lymph-nodes, and the bloodvessels of the spleen and liver—a process which, although less marked, is analogous to the general proliferative changes described by Mallory as occurring in typhoid fever.

The paper is illustrated by twelve photomicrographs, of which those indicating the changes in the tongue, the veins of the spleen, the kidney, and the lymph-nodules of the stomach are the most interesting.

The writer has collected all references to the cell changes of scarlet fever. From these it would appear that, with the exception of the kidney, little work has been done on the histology of the disease.

Subcutaneous Abscesses due to Typhoid Bacillus.—PRATT (*Ibid.*) reports two cases of invasion of the subcutaneous tissues by the bacillus typhosus. In one case an abscess formed over the right olecranon one month after typhoid fever. At the operation no connection was found with the joint or periosteum. In a second case of typhoid fever a purplish, indurated swelling formed on the leg a few days before death. It contained a sero-sanguineous fluid, from which the bacillus typhosus was isolated in pure culture. In the literature he found three cases of abscesses in the subcutaneous tissue and six in muscle-tissue. From an analysis of all the cases he draws the following conclusions: Abscesses in the soft parts due to the bacillus typhosus are usually single. They appear during the latter weeks of fever or early in convalescence. They run an acute course. In this respect they contrast strongly with post-typhoid bone lesions, whose course is characterized by chronicity and a marked tendency to recurrence. They produce few constitutional symptoms. They heal rapidly after incision.

Gonorrhœal Septicæmia and Ulcerative Endocarditis.—THAYER and LAZEAR (*Journal of Experimental Medicine*, January, 1899) add to the literature the report of another case of the above condition, and review the subject of secondary gonorrhœal infections.

In 1895 Thayer and Blumer reported a case of ulcerative endocarditis in which they obtained during life a pure culture of the gonococcus from the blood. At the autopsy the same micro-organism was found in the thrombi upon the mitral valve. The organisms did not grow upon agar-agar and ox-blood serum used as culture media. In the uterus and vagina characteristic gonococci were found.

Previous to this observation nearly a score of cases of acute ulcerative endocarditis had been reported as occurring in the course of gonorrhœa. In several of these cocci, corresponding to the morphology and staining characteristics of gonococci, were found in smears from the valves, but were not grown on culture media.

Thayer and Blumer, by their cultures taken during life, were the first to demonstrate a gonococcal septicæmia.

In the case which Thayer and Lazear now report, the gonococcus was obtained in pure culture on three of the four days immediately preceding death. Two c.cm. of blood were drawn from the median basilic vein and mixed with 4 c.cm. of agar-agar. The growth appeared after forty-eight hours and was abundant. Transplanted upon human blood-serum there was a growth; upon ox-blood serum, gelatin, and bouillon, none.

At the autopsy was found a subacute ulcerative and vegetative tricuspid endocarditis, acute sero-purulent pleuritis and pericarditis, a pulmonary infarct, and subacute hemorrhagic glomerular nephritis. Diplococci corresponding to the gonococcus in morphology and staining reaction were found in smears from the urethra, the vegetations of the tricuspid valve, and the pleural and pericardial exudate. Upon human blood-serum a growth of the gonococcus was obtained from the tricuspid valve, pericardial exudate, and heart's blood.

The writers conclude their report with a review of thirty-two cases in which satisfactory pathological records were made of gonorrhœa with fatal cardiac complications. Of these thirty-one were cases of ulcerative endocarditis and one of perimyocarditis alone.

In many of these micro-organisms corresponding to the gonococcus were found in the vegetations. In three the gonococcus was obtained after death in cultures from the vegetations. In one of these three cases a piece of softened thrombus introduced into the human urethra produced in four days a characteristic gonorrhœa with gonococci in the discharge (Lenharz).

Finally, in Thayer's two cases the gonococcus has been obtained in cultures from the blood during life.

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A STUDY OF LEUCOCYTOSIS ASSOCIATED WITH CONVULSIONS.*

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It is the purpose of this paper to record some observations made on the blood of patients who suffered from convulsive seizures during the progress of general paralysis and other well-recognized diseases. So far as I know, the only observations of the blood during and after convulsions that have been recorded were made in this laboratory by Dr. Capps. Capps[1] studied the blood of a series of cases of general paralysis, and among other things he found that two of these cases had leucocytosis after convulsions. This observation led him to conclude that "there is a leucocytosis after convulsions and apoplectic attacks which is as sudden as it is usually pronounced." It was thought advisable, therefore, to study systematically the blood of a series of cases to determine whether this conclusion was correct for all classes of cases, and to determine the duration and character of such leucocytoses should they be found to exist.

I have studied the blood of seven patients during and after one or more convulsions in each case, and present with them two other cases, a study of whose blood has helped to interpret the phenomena observed.

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* A paper bearing this title and describing Cases I., III., and V. of this series was read, as a preliminary communication, before the American Medico-Psychological Association, at its annual meeting in Boston, May 29, 1896, and was afterward published in the Transactions of that Society.

These cases represent five different diseases and the normal individual. Observations of the blood after convulsions have been carefully compared with observations of the same patient's normal blood in every case but one. In this exceptional case the untimely death of the patient during a prolonged attack, in which convulsions occurred with great frequency, prevented my doing so.

It was, of course, desirable to begin the observations in each instance as soon as possible after the onset of an attack. It was also thought that a specimen of blood taken immediately before a convulsion would be of special interest; but no case presented itself during the two years that these observations were being carried on in which it was possible to foretell the occurrence of a convulsion except those cases suffering from a prolonged attack in which many convulsions occurred in rapid succession. In such cases, however, the specimens taken just before a convulsion were not of unusual interest, for the effects of the previous convulsion had not passed away. It would be of extreme interest to know whether a leucocytosis exists immediately before a convulsion, since we find a marked one immediately afterward.

Examinations were made as soon as possible after the beginning of a convulsion, and repeated at frequent intervals until the blood was found to be morphologically normal. Special attention was given to the white corpuscles, but the red corpuscles were counted, and the hæmoglobin was estimated at sufficiently frequent intervals to furnish a standard of comparison.*

The differential counts have been arranged in a series of tables of percentages, and are placed at the end of the article in the order in which the cases are considered in the text. A table showing the percentages of the various kinds of leucocytes found in the "normal blood" of each patient studied (with the exception already noted) has been arranged and placed with the tables of that patient's abnormal blood.

For convenience of study the cases are grouped or classified according to the clinical diagnosis. Two were senile dementia, one terminal dementia, two general paralysis, one catatonia, and one puerperal eclampsia. Of the two cases not having convulsions one was general paralysis and one a normal, healthy young man. The general paralytic who did not have convulsions had attacks of frenzy, and produced in one of these a leucocytosis of low degree and not belonging to the inflammatory type. —The healthy young man produced a leucocytosis in himself by exercise, but the leucocytosis was not of the inflammatory type, and was of very short duration.

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* For counting the blood a white and a red counter, with the Thoma-Zeiss chamber, were used. Cover-glass specimens were made at the time of each count and stained with the Biondi-Heidenhein stain. The percentages were determined by counting 1000 leucocytes in each specimen. The hæmoglobin was estimated with von Fleischl's apparatus. The classification of leucocytes used was that given by Thayer (2), but no division of transitional cells was made. The large mononuclear elements not having granulations in their protoplasm, even though their nuclei were indented, were classed as large mononuclear elements; whereas the corpuscles showing distinctly indented nuclei and distinct granules in the protoplasm were classified as polymorphonuclear elements, hence the criteria for a polymorphonuclear element were granules and indentation of nucleus.

CASE I. *Senile dementia.*—Mr. W. M., aged sixty-four years. He was admitted to the hospital in October, 1893, which was two years after the beginning of his mental deterioration. He has now had convulsive attacks, at intervals, during the past two and a half years. These convulsions have been of an epileptiform character, of from one to twenty minutes' duration, and accompanied by a complete loss of consciousness.

On January 5, 1896, a convulsion occurred at 6 o'clock A M. The blood was examined forty minutes after the attack, and subsequently at two hourly intervals until it became morphologically normal. The observations showed a leucocytosis of 13,000 immediately after the convulsion, which rose to 16,500, its highest point, four hours later. It then gradually decreased to the normal in six hours more, or in ten hours from the occurrence of the convulsion.

An examination of the cover-glass preparations showed that the polymorphonuclear elements were greatly increased and that the small mononuclear leucocytes or lymphocytes were greatly diminished. The increase in the polymorphonuclear elements was not only absolute, but relative. In the first specimen they constituted 70 per cent. of all the leucocytes; but when the leucocytosis had reached its height, notwithstanding the fact that the absolute number of leucocytes were greatly increased, the percentage of polymorphonuclear elements rose from 70 to 91. As the leucocytosis diminished the normal percentages gradually returned, so that when the actual number of leucocytes had reached 7700 per cubic millimetre the polymorphonuclear elements constituted only 72 per cent., and the lymphocytes had returned to 18 per cent. Synchronously with the increase in the percentage of polymorphonuclear elements and decrease of lymphocytes there was a decrease also in the large mononuclear elements and in the eosinophiles. As the percentage of polymorphonuclear elements decreased that of the large mononuclear elements and lymphocytes increased, but that of the eosinophiles remained low. It is thus seen that this leucocytosis is such a one as is found to accompany inflammatory processes. It disappeared at the end of ten hours after the convulsions. See Table I.

Another attack, consisting of two convulsions eight hours apart, began at 7.37 P.M. on February 19th. The first convulsion lasted eight minutes, was general, but not of great severity. The first specimen of blood was taken immediately after the convulsion, and was found to contain 18,000 leucocytes per cubic millimetre. Subsequent examinations were made every two hours, from which it was found that the leucocytosis gradually decreased during the six hours following the convulsion, and then rose slightly during the next two hours. A second convulsion now occurred, and a specimen of blood taken during this convulsion showed a leucocytosis of 17,200, or almost as great an increase as that accompanying the first convulsion. From this point the leucocytosis gradually diminished and reached the morphological normal thirteen hours later; this was twenty-one hours after the first convulsion.

An examination of the stained specimens showed that the percentage disturbance was present from the first, but became greater a few hours later, and was more variable than in the former attack; yet it was of the same character and belonged to the inflammatory type. See Table II.

On March 6th, I was called by the attendant, as he thought the patient was about to have a convulsion. I found the patient in a very restless, nervous condition; his eyes had a scared, wild expression, and were rolling about in an unsteady, jerky manner; his face, arms, and legs twitched at intervals. A specimen of blood taken showed a leucocytosis of 10,400, with $81\frac{9}{10}$ per cent. polymorphonuclear elements. I say leucocytosis advisedly, for I know that 10,000 white corpuscles per cubic millimetre is not usually considered a leucocytosis; but a comparison of the first differential count recorded in Table III. with the differential counts shown in Table VI. will show that there was a considerable disturbance in the percentages as well as a slight increase in numbers; and Rieder[3] and Elzholz[4] have shown that the percentage variations are to be considered of as great importance as a mere increase in numbers. The patient did not have a convulsion that day. Two hours later he was quietly sleeping, with a pulse of 78, and the twitchings entirely gone, and there were but 6500 leucocytes per cubic millimetre present in the blood. Repeated examinations of this patient's blood when he is in a "normal" condition have shown that his normal average number of leucocytes is but little more than 7000 per cubic millimetre. See Table VI.

On May 8th, at 2.20 A.M., the patient had a very slight general convulsion. I reached him twenty minutes after the seizure, and found him in what seemed to be a quiet sleep. His pulse was 76, and he looked as well as usual. The nurse said the convulsion was very slight and had lasted less than two minutes. A specimen of blood taken forty minutes after the convulsion showed only 9000 leucocytes per cubic millimetre of blood. Another count made two hours later showed a similar result—an almost normal blood. See Table III. A similar attack with a similar condition of the blood occurred on May 15th. I would emphasize the fact that these last two convulsions were very slight and of very short duration. On June 27th a convulsion of five minutes' duration occurred, and was accompanied by a leucocytosis of 14,800; and on August 29th another convulsion of eight minutes' duration occurred, which was likewise accompanied by a leucocytosis—in this instance of 12,800. As in the former attacks, the leucocytoses were of the inflammatory type. See Tables IV. and V.

This patient has had other convulsions similar to those studied, but it was thought the seven attacks studied were sufficient to prove that convulsions, when of considerable severity, in this patient at least, are accompanied by leucocytosis, and that these leucocytoses are of the inflammatory type, and that their duration varies from one to many hours—eighteen hours in one instance (Table II.)—after two convulsions.

CASE II. *Senile confusion; arterio-sclerosis.*—Mr. W. L. B., aged fifty-nine years. Family history good; habits good. "Kidney trouble," from which he recovered, in 1889. No other illness. Admitted to the hospital in September, 1896. He was very much confused and incoherent, but had been failing mentally only a few months. He was physically large and well nourished. Pupils small and equal, but reacting normally to light and in accommodation. No tremor of muscles. Romberg's symptom absent. Reflexes normal. Arteries much hardened. He had never had convulsions until about a week before admission, when he had two on different days. He continued to have convulsions at intervals of a few days after admission. On September 11th, at 4.40 P.M., he had a slight general convulsion of about one minute's duration. A blood examination, made five minutes later, showed 11,000 leucocytes per cubic millimetre; and the differential count of this specimen gave $72\frac{6}{10}$ per cent. polymorphonuclear elements; $16\frac{6}{10}$ per cent. lymphocytes; 9 per cent. large mononuclear elements; $1\frac{2}{10}$ per cent. eosinophilic leucocytes; and $\frac{6}{10}$ of 1 per cent. myelocytes. It is thus seen that the percentages of the usual kinds of leucocytes were present in the proportions commonly found in normal blood, but the presence of myelocytes gave to the specimen an abnormal appearance. Another blood-count was made three hours later, and 7000 leucocytes per cubic millimetre found; an examination of the stained specimens showed normal percentages and an absence of myelocytes. Examinations made on September 12th and 13th showed a normal number of leucocytes, which were present in normal proportions. On September 14th he again began to have convulsions. They began at 4.50 A.M. and recurred with great frequency until 1.20 P.M. of the same day, at which time the patient died. During the intervening time he had fifty-three convulsions. A blood-count was made at 7.25 A.M., or two and a half hours after the beginning of the attack, and 16,200 per cubic millimetre found. The stained specimens showed $81\frac{1}{10}$ per cent. polymorphonuclear elements, with a corresponding decrease of the other elements, and at the same time the presence of $\frac{3}{10}$ of 1 per cent. myelocytes. Another examination made at 10.36 A.M. showed a leucocytosis of 24,600, with $86\frac{5}{10}$ per cent. polymorphonuclear elements; $6\frac{4}{10}$ per cent. lymphocytes; 6 per cent. large mononuclear elements; only $\frac{1}{10}$ of 1 per cent. eosinophilic leucocytes, and 1 per cent. myelocytes. It is thus seen that a very marked leucocytosis was present, and that this leucocytosis was of the inflammatory type, and was present until death, which occurred soon after a convulsion. Compare Tables VII. and VIII. with Table IX., which shows the percentages of this patient's normal blood.

The patient died at half-past 1 o'clock on September 14th, having been in the hospital but a short time. Autopsy could not be obtained. An analysis of his urine is appended.

September 9, 1896. Color normal; specific gravity 1021; reaction neutral. A very slight trace of albumin; no sugar.

Sediment. Numerous pus-cells and squamous epithelium. A few renal cells. A few large round-cells and caudate cells. No casts seen.

CASE III. *Terminal dementia.*—Miss C. S., aged eighty-nine years, was admitted to the hospital in 1843, and has now been demented for about fifty years. I do not know what her original mental disease was, but she came to the hospital in her fourth attack, when she was thirty-five years old. She is now confined to bed by the infirmities of age. She has suffered from convulsions of an epileptiform character during the past ten years. They have been few and have occurred at long intervals; sometimes only two or three during an entire year. Her blood has been studied after two of these attacks.

On January 8, 1896, she had four convulsions between one and two o'clock in the morning. The convulsions were general and severe, and were preceded by pretty general muscular twitchings, more marked on the left side, during a period of three or four hours. The first blood examination was made at 9 o'clock, or seven hours after the convulsion, and a leucocytosis of 21,500 found. The examinations were made every two hours from this time until the blood became morphologically normal, eight hours later, or fifteen hours after the convulsions had ceased. It was found that the leucocytosis decreased steadily and gradually from its height to the normal. An examination of the cover-glass preparations showed this leucocytosis to be of the inflammatory type; but the percentage of polymorphonuclear elements was not so great as was found in some cases. It is, of course, impossible to say whether the leucocytosis was not greater and the percentage of polymorphonuclear elements higher at some time between the last convulsion and the first examination of the blood than it was when the first examination was made. See Table X.

The second attack studied occurred at 2.50 P.M., May 10, 1896, and the first specimen of blood was taken forty minutes after the onset of the convulsion, which was general and lasted about five minutes. The specimen was found to contain 12,000 leucocytes per cubic millimetre. From this point the leucocytosis steadily increased, to reach its highest point of 21,600 eight hours later. An examination of the cover-glass preparations showed this leucocytosis to be of the inflammatory type. When the leucocytosis was at its highest point the polymorphonuclear elements constituted 92 per cent. of all the leucocytes present. See Table XI.

The leucocytosis had not entirely disappeared at the end of nineteen hours after the convulsion.

CASE IV. *General paralysis.*—Mr. J. F., aged forty-three years. Memory failed from 1892; queer actions since 1894. Admitted to the hospital in April, 1895. Confused and deluded. Argyll-Robertson pupil absent. Tremor of facial muscles and of tongue. Knee-jerks equal and normal. Co-ordination of muscles somewhat impaired. Grave memory and judgment defect.

On July 23, 1896, at 5.25 P.M., he had a general convulsion, accompanied by loss of consciousness and a sudden fall to the floor. The convulsion lasted about five minutes and the pulse rose to 100. A specimen of blood taken at the close of the twitchings showed a leucocytosis of 18,400. From this point it gradually decreased, and reached the normal four hours later, at which time the patient seemed as usual.

A study of the stained specimens showed the leucocytosis to be of the inflammatory type: great increase of polymorphonuclear elements, corresponding decrease of mononuclear elements, and absence of eosinophilic leucocytes. See Table XIII. The leucocytosis lasted four hours.

On September 20th he was again attacked with convulsions. They began at 11 o'clock in the morning, and on account of the absence of the laboratory staff no blood examination was made until half-past 8 that evening; but during this time he had had several, perhaps ten or twelve, convulsions, and continued in the convulsive state until his death, on the evening of the following day. The specimen of blood taken at 8.30 P.M. on September 20th, nine hours after the onset of the attack, showed a leucocytosis of 26,400. The patient was now etherized in an attempt to stop the convulsions. As soon as the twitchings were stopped by the ether his pulse dropped from 100 to 72 beats per minute. He was kept under ether for more than three hours. Two blood-counts made during that time showed a leucocytosis of 22,600 and 20,600, respectively. As soon as the ether was removed the convulsions returned, and occurred at intervals until the patient's death, on the following day. He did not regain consciousness. At half-past ten the next day his blood showed a leucocytosis of 33,000, which was the highest point reached. From this point it receded, and was found to be 18,000 one hour before death.*

This leucocytosis was also of the inflammatory type. The greatest percentage of polymorphonuclear elements—$93\frac{4}{10}$—was present at 10 P.M. on the first day of the attack. When the leucocytosis was at its highest point there was present $11\frac{8}{10}$ per cent. large mononuclear elements. This was about seven hours before the patient died. See Table XIV. and compare with Table XV.

It is worthy of note that while the patient was under the influence of an anæsthetic the leucocytosis persisted, although the twitchings and muscular exertion were absent. It is also worthy of note that the character of the leucocytosis did not change while the patient was under ether. The leucocytosis persisted until the patient's death.

CASE V. *General paralysis.*—Mr. W. C. S., aged forty-two years, single. Syphilis several years ago. No other sickness. Present illness began with nervousness and occasional losses of consciousness, in 1894. Admitted to the hospital January, 1896. Irritable, confused; memory and judgment markedly impaired. Marked sense of well-being. Large, strong man, of athletic build. Pupils equal, and react normally to light and in accommodation. Knee-jerks diminished. Romberg's symptom absent. Occasional slurring of labials in speech. No other inco-ordination detected. At the time of the onset of the convulsive seizure of which I am about to speak he had been sleeping well, eating well, and going to drive daily. He was still in good physical condition, although a well-marked case of general paralysis of the insane.

He had a slight convulsion at 4 A.M., February 15th, accompanied by a leucocytosis of 13,000, from which height it receded and reached the morphological normal at the end of five hours. See Table XVI. On March 11th, at 12.35 A.M., he had another convulsive attack, which lasted six and a half days and terminated in death. From the onset of the convulsions he was unconscious. The onset of the attack was very severe, the convulsions coming very rapidly and with great intensity. During the first twenty-four hours he had sixty-two convulsions; during the second twenty-four hours he had eighteen; during the third twenty-four hours he had thirteen; during the fourth twenty-four hours he had seven; during the fifth twenty-four hours he had five; during the sixth twenty-four hours he had one. He therefore had one hundred and six convulsions in six days; but they began with great severity and frequency, and gradually diminished in number until they ceased entirely thirty hours before his death.

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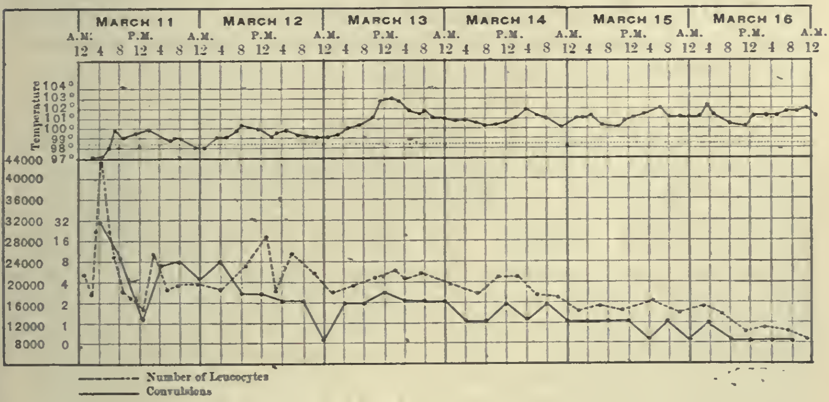
* As I was absent from the hospital at this time, the leucocyte counts in this case after September 20th were kindly made for me by Dr. Hoch The differential counts were made by me, as in the other cases.

A blood-count was made thirty-five minutes after the onset of the attack; at hourly intervals for the next six hours; at two-hour intervals during the remainder of that day, and at four-hour intervals during the remainder of the attack. At the first examination he was found to have a leucocytosis of 20,500. This leucocytosis increased until 4.20 A.M., or a little less than four hours after the onset of the attack, when it reached the exceedingly great number of 43,500. From this height it receded somewhat, but persisted as a marked leucocytosis throughout the attack. During the first four hours he had thirty-two convulsions, and his leucocytosis was 43,000. During the second four hours he had eight convulsions, and the leucocytosis at the end of that time was 24,000. So, if we take any period of four hours, we will see that there is a relation between the number of convulsions and the height of the leucocytosis. This relation is not a simple one. We cannot say, because one convulsion has an accompanying leucocytosis of 16,000, that two convulsions will be accompanied by a leucocytosis of 32,000; three convulsions by a leucocytosis of 48,000, and so on; but we do find by such comparison that as the convulsions increase or diminish in a geometrical ratio the accompanying leucocytosis increases or diminishes in an arithmetical ratio. During the first four hours he had thirty-two convulsions, and at the end of that time a leucocytosis of 43,000; during the second four hours he had eight convulsions and an accompanying leucocytosis of 24,000; during the next four hours he had one convulsion, and the accompanying leucocytosis dropped to 15,000. The leucocytosis did not fall below this point at any time during the attack until after the last convulsion on the sixth day, although there were several four-hour periods occurring at different times, during which there was but a single convulsion; and, indeed, during the period between 4 P.M. and 12 o'clock A.M. on the second day no convulsions occurred. But we have seen in our other cases that the leucocytosis accompanying a single convulsion persists, although possibly in a diminished degree, for from eight to fifteen hours after the attack; and that in some cases it increases during the first three or four hours.

The relation between the number of convulsions and the amount of the leucocytosis is not a simple one, nor is it an exact one; but when this relation is expressed graphically there is seen a striking similarity in the two curves that must be drawn to represent the condition. If, therefore, we represent on a four-hour chart the number of convulsions occurring in each succeeding period of four hours, allowing the first space above the base-line to represent one convulsion; the second space two convulsions; the third space four convulsions; the fourth space eight convulsions; the fifth space sixteen, and the sixth space thirty-two convulsions, then we will plot a curve which begins at the sixth line and gradually but irregularly approaches the base-line as the convulsions grow less frequent in occurrence. This curve will become tangent to the base-line on the sixth day, when the convulsions entirely cease. If now we allow each space parallel with the base-line on this same chart to represent 4000 leucocytes, calling the base-line the normal number, or 8000; the first line above the base 12,000; the second, 16,000, and so on, and plot another curve to represent the leucocytosis observed during the progress of the attack, we will see that the two lines thus drawn, although irregular, run a strikingly similar course. It will be seen that these lines are both at their height at the end of the first four hours of the attack, and that their descent, though irregular, is essentially a constant one. In plotting these curves the intensity of the convulsions could not be expressed; simply their number. On the second day the number of convulsions was much less than on the first day, but some of them were very severe. This circumstance probably accounts for the great irregularity of the leucocyte curve on that day. After the second day the convulsions were of much the same character as during the first day, and continued so throughout the attack. The accompanying chart was plotted according to the foregoing principles. The unbroken line represents the number of convulsions; and its index of geometrical ratio, from zero to 32, is drawn at the left-hand margin of the chart. The dotted line represents the number of leucocytes, and its index of arithmetical ratio from 8000 to 44,000 is also shown at the left-hand margin.



It has often been asked what relation an elevated temperature has to an accompanying leucocytosis. My observations of this case show that there is no definite relation between them. The temperature of this patient was taken every time a blood-count was made. The temperature-curve is plotted on this chart above the other two curves. From this curve it is seen that no constant relation exists, either between the number of leucocytes and temperature or between the number of convulsions and the temperature. Indeed, at the beginning of the attack, when the number of convulsions and leucocytes was greater than at any other time, the temperature was subnormal.

An examination of the stained specimens showed that this leucocytosis was also of the inflammatory type, but with greater percentage disturbance than in the other cases already considered. In one specimen taken early in the attack there was 24 per cent. large mononuclear elements and $7\frac{3}{10}$ per cent. eosinophilic leucocytes. Before the leucocytosis reached its height a few myelocytes appeared and were present in varying degree during the progress of the attack. The eosinophilic leucocytes, which constituted $7\frac{3}{10}$ per cent. of all the leucocytes in the first specimen, rapidly disappeared and were entirely absent during the greater part of the attack; but they began to reappear as the leucocytosis subsided after the convulsions had ceased on the day before the death of the patient. The highest percentage of polymorphonuclear leucocytes reached was 97½. In the same specimen the lymphocytes reached their lowest percentage, which was $\frac{3}{10}$ of 1 per cent. This occurred at 5.30 A M. on the morning of the attack. See Table XVII., March 11th, 5.30 A.M. Table XVII. shows the many differential counts that were made, and the chart shows diagrammatically the relation of the convulsions and the accompanying leucocytosis.

CASE VI. *Catatonia.*—J. J. M. The patient, a man, thirty-five years old, became depressed three months before admission; had vague apprehensions of death. A few days before admission he is said to have prayed loudly and excitedly and called for a priest, and to have continued this until admission. His condition for the first few days at the hospital was characterized by reticence; he would answer no questions, and was resistive toward everything that was done for him. During the fourth day he suddenly threw himself on the ground and tried to dig his own eyes out. These sudden, impulsive acts continued next day; and the day following, May 10th, he had a series of convulsions, during which the blood was examined. At 8.30 A.M. he had a slight convulsive attack, which was not observed by a physician. It was followed by a stuporous condition, with a temperature of 100.8°; pulse 92; respiration 56. At 8.45 a blood-count was made, which showed a leucocytosis of 14,000. At 10.15 another attack began with rapid breathing, gurgling sounds in the throat, frothing at the mouth, and a persistent turning of the head to one side. Then began clonic movements of the arms and legs, accompanied by a rapid movement of the head from side to side. The eyes were closed; the movements were rhythmical and continued for about half an hour. At times they stopped, and, on being resumed, began by a marked twitching of the facial muscles, drawing both angles of the mouth back, followed by a general tremor of the right arm, which gradually involved both arms, then the entire body. Toward the last the movements became more voluntary, the hands were held up as in prayer, and finally threatening motions were made, and the patient became so violent that it was necessary for his attendants to hold him. During this period of excitement he shouted very loudly, "O, Lord, have mercy!" and "Glory be to God!" repeating these phrases over and over again.

Blood examinations made at 9.45 and 10.45 A.M. showed leucocytosis of 10,800 and 13,200, respectively, with 80 and $81\frac{9}{10}$ per cent. polymorphonuclear elements. See Table XVIII.

The patient gradually became quiet, answered questions, but spoke of his sister having been abused and killed in the hospital. At 4.25 P.M. he had another attack, making the same rhythmical movements of head and limbs. His eyes were fixed on the ceiling with widely dilated pupils. The pupils reacted to light, and the corneal reflexes were present, but the patient did not wink until the cornea was actually touched.

At one time the patient was firmly held for the purpose of getting a drop of blood from the lobe of his ear. He stopped moving for a very short time, but resumed the movements as soon as released. Toward the last of the attack he groaned with each movement. At this time an attempt was made to carry him to another room, when he suddenly jumped up and attacked his attendants. When again put to bed the same movements returned and persisted for about an hour from the beginning of the attack. A blood examination made at 4.45 P.M. showed a leucocytosis of 19,800, with $79\frac{6}{10}$ per cent. of polymorphonuclear elements. At about 5.30 P.M. the movements ceased, and he soon went out in the hall, where he sat quietly, drank some milk, and would occasionally talk with his attendant. A blood examination made at 7.45 P.M. showed that the leucocytosis had dropped to 11,200, with $84\frac{2}{10}$ per cent. polymorphonuclear elements. See Table XVIII.

On May 13th he had another attack, which was similar to the one preceding it. It was likewise accompanied by a leucocytosis. In this instance only one blood examination was made, and it was found that 10,400 leucocytes, with $83\frac{2}{10}$ per cent. polymorphonuclear elements, were absent.

Following this period of convulsions the patient showed the typical picture of catatonia with mutism, refusal of food, and well-marked muscular negativism; later with delusions of influence and frequent verbigeration. He has not recovered completely, but has remained somewhat apathetic and has retained some delusions of a religious, mystical character, which he does not, however, further elaborate.

CASE VII.* *Puerperal eclampsia.*—Mrs. A. L. G., aged thirty-eight years, was admitted to the Boston City Hospital in an unconscious condition on January 9, 1897. She was seven months pregnant with her eighth pregnancy, the seventh having terminated naturally eight years before. During the present pregnancy she had been troubled with much headache, which was especially severe at night. About a month before admission her eyes became convergent during a severe headache, and remained so for two days. She thinks that her daily amount of urine has been increased of late. On the evening preceding admission she had a severe pain in the epigastrium, which lasted all night and kept her from sleeping. At about five o'clock on the morning of admission she had a convulsion, and another later in the day. She did not regain consciousness, and was brought to the hospital, where I saw her in her third convulsion at 2 P.M. This convulsion was general and severe, and lasted about three minutes. The patient became rigid and cyanosed, and then began general, strong clonic spasms of arms, legs, and muscles of neck and trunk. The tongue was severely bitten, and froth came from the mouth. From a puncture which had been previously made in the lobe of the ear very dark purple blood oozed.

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* My thanks are due to Drs. A. L. Mason and George Haven for the privilege of studying the blood of this patient.

A blood-count made during the last of these twitchings showed a leucocytosis of 25,200, with 91 per cent. polymorphonuclear elements. Examinations of the blood were made at 3 P.M., 4.20 P.M., and 5.45 P.M., showing leucocytosis of 25,000, 17,800, and 18,800, respectively, with 90, 92, and 86½ per cent. polymorphonuclear elements. See Table XXIII. The patient had not regained consciousness when the last of these counts was made. On the following day she was conscious and had a leucocytosis of 15,000. Repeated examinations of the blood were made during the succeeding days, and it was found that the normal number of leucocytes was not reached until January 30th, and that the normal number of red corpuscles had not been reached when the patient was discharged, February 19th.

On January 12th a premature labor took place, and the leucocytosis reached 32,400. The decrease of red corpuscles took place at this time and was found to be 2,600,000 on the 14th.

An examination of Table XXIII. will show that this leucocytosis was of the inflammatory type, but that the polymorphonuclear elements were not present in so great a per cent. as in most of the convulsions of general paralysis. The leucocytosis, on the other hand, persisted for many days. The recovery of the patient and the return of the blood to its morphological normal were in close relation; as the patient gradually recovered, the leucocytosis as gradually disappeared. The red corpuscles were even slower to return to their normal number. The disturbance in the morphology of the blood was further evidenced by the presence of nucleated red corpuscles in many of the stained specimens. In Table XXIII. the number of nucleated red corpuscles seen while counting 1000 leucocytes is indicated in the column at the extreme right. Five nucleated red corpuscles was the greatest number seen in any one specimen, and this gives one nucleated red corpuscle to 49,000 normal reds. Table XXIII., January 19th. In this same specimen was more than 4 per cent. myelocytes.

Additional Clinical Notes. Patient was discharged from the hospital February 19th, feeling perfectly well and free from eye symptoms and œdema of ankles. Her urine showed only $\frac{1}{15}$ per cent. albumin. She was next seen at her home on June 15th, at which time her blood was found to be morphologically normal, but with a low per cent. of hæmoglobin. See Table XXIV. Her urine contained about ¼ per cent. albumin. She said that she had been fairly well since leaving the hospital, but that her ankles had swollen toward evening, and that she had had two severe attacks of dyspnœa. On August 17th she was seen in the out-patient department, at which time she was feeling somewhat worse. She said she was again pregnant, and had been vomiting considerably. Her blood was morphologically normal, and her urine contained ⅛ to ¼ per cent. albumin.

Urine analyses. January 11*th*. Color high; specific gravity 1021. Reaction acid; urea 2.14 per cent. Albumin ½ per cent. Bile pigment and sugar absent.

Sediment. Many hyaline, granular, few fatty and waxy casts, most with fat, a few with fatty renal cells, and compound granular cells adherent. Considerable normal and abnormal blood. Some pus free and in clumps.

15*th.* Color pale; specific gravity 1013. Reaction acid. Albumin ½ per cent. Bile pigment and sugar absent.

Sediment. Many hyaline and fine and coarse granular casts; some with fat and cells adherent; few compound granular cells.

February 5*th.* Color normal; specific gravity 1020. Reaction acid. Urea 2.02 per cent. Albumin $\frac{2}{15}$ per cent. Bile pigment and sugar absent.

Sediment. Numerous squamous and scaly cells, numerous renal cells, some fatty and compound granular cells, with fat crystals protruding. Numerous hyaline and granular and occasional fatty casts. Casts with fat, some with renal cells, and occasionally one with compound granular cells adherent.

16*th.* Color slightly pale; specific gravity 1014. Reaction acid. Albumin $\frac{1}{15}$ per cent. Bile pigment and sugar absent.

Sediment. Chiefly squamous and scaly epithelium; some pus. Rather numerous hyaline and granular casts, some with fatty renal and compound granular cells, occasionally one with blood and most of them with fat adherent. Numerous renal cells, some fatty and a few compound granular. Little blood and rarely highly refractive cast.

June 19*th.* Color high; 1140 c.c. in 24°; specific gravity 1014. Reaction acid. Albumin ¼ per cent. Bile pigment and sugar absent.

Sediment. Many squamous and scaly cells, many leucocytes. Many fine granular casts, few of which have compound granular cells adherent. Few hyaline casts. Some normal and abnormal blood, renal cells and compound granular cells. Few caudate cells.

August 17*th.* Color pale. Specific gravity 1012. Reaction acid. Albumin ⅛ to ¼ per cent. Bile pigment and sugar absent.

Sediment. Pus free and in clumps; large and small round-cells; squamous epithelium; large caudate, and rarely a compound granular cell. An occasional small granular and more frequently a large hyaline cast, some with leucocytes and normal blood adherent.

CASE VIII. *General paralysis.*—Mr. W. E. O., aged fifty years, typical general paralysis since 1892. The patient has not had true epileptiform convulsions, but has had repeated attacks of frenzy, during which he has become extremely excited and has done an immense amount of work—probably more than a sane man could do under any stimulus—in a given time. During a period of frenzy which occurred on April 19th his temperature rose to 101.2° and pulse to 116. His blood, studied at this time, showed 16,600 leucocytes per cubic millimetre, with $65\frac{8}{10}$ per cent. polymorphonuclear elements and $29\frac{3}{10}$ per cent. lymphocytes. This leucocytosis soon disappeared, and at the next examination only 10,000 leucocytes per cubic millimetre were present. The character of this leucocytosis, as evidenced by its percentages, was very different from those already studied. It did not belong to the inflammatory type. Its low percentage of polymorphonuclear elements and its short duration were its distinctive features.

The first count showed 16,600 leucocytes, with the following differential count:

	Per cent.
Polymorphonuclear elements	65.8
Lymphocytes	29.3
Large mononuclear elements	4.5
Eosinophilic leucocytes	0.4
	100.0

Three hours later he had 10,000 leucocytes, with the following differential count:

	Per cent.
Polymorphonuclear elements	66.7
Lymphocytes	27.2
Large mononuclear elements	4.2
Eosinophilic leucocytes	1.9
	100.0

Case IX.—Mr. X., a young man, student, kindly consented to exercise violently for me and allow me to study his blood. At 9.30 p.m., June 21st, three hours after a hearty meal and during rest, he had 13,000 leucocytes, with the following differential count:

	Per cent.
Polymorphonuclear elements	76.3
Lymphocytes	16.1
Large mononuclear elements	6.3
Eosinophilic leucocytes	1.3
	100.0

At 10 p.m., after three minutes' very violent and unusual exercise (running), pushed to the point of first exhaustion, he had 17,000 leucocytes, with the following differential count:

	Per cent.
Polymorphonuclear elements	60.4
Lymphocytes	21.8
Large mononuclear elements	15.3
Eosinophilic leucocytes	2.5
	100.0

At 10.20 p.m., after twenty minutes' absolute quiet, reclining at full length on the floor, he had 11,400 leucocytes, with the following differential count:

	Per cent.
Polymorphonuclear elements	61.0
Lymphocytes	24.7
Large mononuclear elements	11.9
Eosinophilic leucocytes	2.4
	100.0

At 11 p.m., after a slow, long run to the point of extreme fatigue, he had 8800 leucocytes, with the following differential count:

	Per cent.
Polymorphonuclear elements	57.4
Lymphocytes	23.3
Large mononuclear elements	18.0
Eosinophilic leucocytes	1.3
	100.0

At 11.30 P.M., after thirty minutes' rest, part of the time lounging in a large chair and part of the time reclining at full length on the floor, and feeling in perfectly good condition, he had 8900 leucocytes, with the following differential count:

	Per cent.
Polymorphonuclear elements	63.4
Lymphocytes	20.5
Large mononuclear elements	15.1
Eosinophilic leucocytes	1.0
	100.0

These differential counts show that the leucocytosis was not of the inflammatory type. The large number of leucocytes present at the beginning of the experiment was probably a digestive leucocytosis. The leucocytosis of 17,000, which occurred after the short, violent exercise, shows by its 60 per cent. polymorphonuclear elements that it is not of the inflammatory type. I do not think the muscular work performed during any convulsion that I have seen equalled that done by this athlete.

This study has shown that there is a leucocytosis associated with convulsions, and that the leucocytosis bears, in a general way, a relation to the severity of the convulsive attack. The leucocytosis is of variable duration, lasting from three or four hours to twelve or fifteen hours after the convulsion. The leucocytoses accompanying true convulsions were invariably of the inflammatory type; the more severe and pronounced the convulsion the higher the percentage of polymorphonuclear elements, with a corresponding decrease in the mononuclear elements.

The small mononuclear elements or lymphocytes were usually both relatively and absolutely diminished. In some of the differential counts, however, they were absolutely increased, although relatively much diminished.

The average normal percentage of large mononuclear elements varied so widely in the different cases that no conclusion of value can be drawn from them in the several leucocytoses studied. As was found by Capps in many cases of general paralysis, they were increased in the blood of one of my cases of general paralysis when the patient was free from the influence of convulsions—*i. e.*, in that patient's "normal blood." This is also true of the case of senile confusion or arterio-sclerosis, of the case of catatonia, and the case of puerperal eclampsia. One case of general paralysis, the case of senile dementia, and the case of secondary dementia did not show an increase above what Capps found to be the average percentage for the normal individual; but as the individual cases from which he computed his averages show considerable variation, one from another, I do not attach any importance to the facts here recorded.

The large mononuclear elements were usually absolutely increased after convulsions, but were sometimes relatively diminished; and in a few instances—fifteen times in 132 counts—were absolutely diminished.

The eosinophilic leucocytes were usually decreased in pronounced leucocytoses, but were markedly increased in three specimens of blood —one from Case I. and two from Case V. See Tables III., XVI., and XVII. That from Case I. was taken not after a true convulsion, but after a period of muscular twitchings and restlessness and during a leucocytosis of low degree. Those from Case V. were both taken immediately after convulsions—one at the beginning of a prolonged convulsive attack. In this specimen they constituted $7\frac{3}{10}$ per cent. of the entire leucocytosis; but as the attack progressed they rapidly decreased, and were absent from more than two-thirds of the specimens taken during the entire attack. See Table XVII. I am unable to draw any conclusions concerning the eosinophilic leucocytes except that in these cases they are usually markedly decreased in pronounced leucocytoses.

A few myelocytes were present in most cases, especially if the convulsion was prolonged or severe. They were most plentiful in the puerperal eclampsia case, and next so in the case of general paralysis, who had the prolonged convulsive attack which lasted six days—that is, in those cases exhibiting the most profound systemic and hæmic disturbances. See Tables XVII. and XX.

It is known that vigorous muscular exercise will produce a moderate leucocytosis. The question, therefore, arises: are the leucocytoses accompanying convulsions produced by the muscular exertions of the patients during the convulsions? With this query in mind the blood of a patient suffering from general paralysis, who had attacks of frenzy during which he did an immense amount of work was studied (Case VIII.). Experiments were performed with a healthy young athlete, and the character and duration of the leucocytosis produced in him by exercise were also studied (Case IX.). It was found in both of these cases that leucocytoses were present, but of moderate degree and of short duration. Moreover, they were not of the inflammatory or pathological type, as is shown by the normal percentages of the various kinds of leucocytes. According to Cabot,[5] Schultz[6] described the leucocytosis of exercise several years ago. Since the leucocytoses accompanying true convulsions were inflammatory and usually persisted for several hours, it seems safe to conclude that the muscular work does not produce them; but a study of the tables of percentages shows that in a large majority of instances in which the first examination of the blood was made immediately after the convulsion the leucocyte-count was somewhat higher and the percentage of polymorphonuclear elements somewhat lower than at the next examination. See Tables II., IV., V., XIII., XVI., XVII., and XVIII. This fact may be accounted for by assuming that the muscular work played a small part in the production of the leucocytosis shown in this first count. There are two instances (Tables I. and XI.) that do not bear out this assumption. These instances, however, occurred in Cases I. and III., both of whom were bed patients and in an asthenic condition; but it must be said, in fairness, that Case I. had given this leucocytosis of exercise on other occasions. Since a leucocytosis of exercise has a comparatively low per cent. of polymorphonuclear elements, and an inflammatory leucocytosis has a high per cent. of polymorphonuclear elements, we would expect, *a priori*, that if a leucocytosis of exercise be added to a pathological leucocytosis the resultant leucocytosis would have a smaller per cent. of polymorphonuclear elements than a pathological leucocytosis alone; for if we have a leucocytosis of 15,000 with 95 per cent. polymorphonuclear elements, to which we add a leucocytosis of 5000 with 65 per cent. polymorphonuclear elements, the resultant will be a leucocytosis of 20,000 with 87½ per cent. polymorphonuclear elements. This is practically what we do find in our tables. For example, in Table II. the first count, which was made as soon as the muscular twitchings of the convulsion had ceased, showed 18,000 leucocytes, with 83 per cent. polymorphonuclear elements; and the second count, made two hours later, showed 16,800 leucocytes, with almost 93 per cent. polymorphonuclear elements—that is, the leucocytosis due to muscular work, with its relatively low percentage of polymorphonuclear elements, had disappeared when the second count was made. In this instance it constituted 6⅔ per cent. of the entire leucocytosis, and its subtraction from the first combined leucocytosis left a smaller leucocytosis, with relatively 12 per cent. more polymorphonuclear elements. An examination of the other tables (IV., V., XIII., XVI., XVII., and XVIII.) shows a similar condition. Furthermore, the same thing is to be seen in five instances in Capps's[1] table, in which his observations of the blood after convulsions are recorded—a fact, however, to which he has not called attention.

We have thus been able to show that the muscular work of the convulsion cannot alone explain the leucocytosis found after the convulsion, and have demonstrated that such a leucocytosis is made up of two parts—a physiological one, due to muscular work, in which the different forms of the leucocytes are increased proportionately, and a pathological one, in which the polymorphonuclear elements are increased out of proportion to the other forms; and in the leucocytosis found an hour or two after the convulsion the first portion has disappeared, as is shown by the fall in the total leucocyte-count and rise in the percentage of polymorphonuclear elements.

TABLES OF CASES OF LEUCOCYTOSIS ASSOCIATED WITH CONVULSIONS.

	Hour.	Leucocytes.	Actual number per c.mm.					Percentages.					Red corpuscles.	Hb. pr.ct.	Remarks.
			Polyn.	Lymph.	L.M.N.	Eosin	Myelo.	Polyn.	Lymph.	L.M.N.	Eosin.	Myelo.			
TABLE I. Case 1.															
Jan. 5, 1896	6.40 A. M.	13,000	9100.0	2665.0	1040.0	195.0	......	70.0	20.5	8.0	1.0	......	4,580,000	90	Convulsion of six minutes' duration at 6 A.M.
	10.00	16,500	1547.0	792.0	495.0	66.0	......	91.8	4.8	3.0	0.4	......			
	12.00 M.	14,200	12879.4	880.4	379.6	42.6	......	90.7	6.2	2.8	0.3	......			
	2.00 P. M.	11,400	9861.0	900.6	547.2	91.2	......	86.5	7.9	4.8	0.8	......			
	4.00	7,740	5619.2	1431.9	657.9	31.0	......	72.6	18.5	8.5	0.4	......			
TABLE II. Case 1.															
Feb 19, 1896	7.45 P. M.	18,000	14940.0	1728.0	1260.0	72.0	......	83.0	9.6	7.0	0.4	......	3,450,000	80	Convulsion lasting eight minutes began at 7.37 P.M.
	9.45	16,800	15607.2	436.8	722.4	33.6	......	92.9	2.6	4.3	0.2	......	3,640,000	80	
	11.45	14,500	13383.5	290.0	739.5	87.0	......	92.3	2.0	5.1	0.6	......			
Feb. 20, 1896	1.45 A. M.	15,200	13391.2	592.8	1109.6	106.4	......	88.1	3.9	7.3	0.7	......			
	3.10	17,280	14567.0	898.6	1624.3	190.1	......	84.3	5.2	9.4	1.1	......	4,240,000	80	Second severe convulsion lasting seven min. began at 3.05 A.M.; hence this specimen was taken during the muscular twitchings.
	4.55	15,400	13998.6	477.4	847.0	77.0	......	90.9	3.1	5.5	0.5	......			
	7.10	12,400	11594.0	297.6	471.2	37.2	......	93.5	2.4	3.8	0.3	......			
	9.10	14,800	13704.8	414.4	606.8	74.0	......	92.6	2.8	4.1	0.5	......	4,500,000	85	
	12.00 M.	13,600	12702.4	326.4	516.8	54.4	......	93.4	2.4	3.8	0.4	......			
	2.00 P. M.	9,000	8154.0	288.0	522.0	36.0	......	90.6	3.2	5.8	0.4	......			
	4.45	9,400	8403.6	451.2	470.0	75.2	......	89.4	4.8	5.0	0.8	......			
Feb. 21, 1896	10.00 A. M.	7,400	6578.6	355.2	362.6	103.6	......	88.9	4.8	4.9	1.4	......	3,400,000	60	
TABLE III. Case 1.															
Mar. 6, 1896	8.30 A. M.	10,400	8517.6	873.6	686.4	280.8	41.6	81.9	8.4	6.6	2.7	0.4	4,880,000	80	No convulsion, but marked muscular twitching.
	10.30	6,500	5453.5	468.0	403.0	149.5	26.0	83.9	7.2	6.2	2.3	0.4			
	3.00 P. M.	7,500	6465.0	435.0	135.0	465.0	......	86.2	5.8	1.8	6.2	......			
Mar. 14, 1896	9.15 A. M.	8,400	6972.0	873.6	436.8	117.6	......	83.0	10.4	5.2	1.4	......	3,720,000	70	Patient is nervous and stupid.
May 8, 1896	3.00	9,000	6534.0	1512.0	594.0	360.0	......	72.0	16.8	6.6	4.0	......	4,920,000	80	Convulsion of one minute's duration at 2.20 A.M.
	4.15	7,200	5025.6	1454.4	532.8	187.2	......	69.8	20.2	7.4	2.6	......			
TABLE IV. Case 1.															
June 27, 1896	9.00 A. M.	14,800	10774.4	2960.0	888.0	177.6	......	72.8	20.0	6.0	1.2	......	4,200,000	80	Convulsion lasting five minutes began at 8.45 A.M
	10.00	6,200	5555.2	434.0	136.4	74.4	......	89.6	7.0	2.2	1.2	......	4,000,000	80	
	11.15	9,600	8755.2	604.8	144.0	96.0	......	91.2	6.3	1.5	1.0	......			
TABLE V. Case 1.															
Aug. 29, 1896	2.20 P. M.	12,800	10982.4	1254.4	268.8	204.8	85.6	85.8	9.8	2.1	1.6	0.7	4,840,000	80	A convulsion of one minute's duration occurred at 7.23 A.M.; second one at 1.30 P.M., which lasted eight minutes.
	4.00	11,900	10388.7	1201.9	226.1	83.3	......	87.3	10.1	1.9	0.7	......	4,620,000	75	
	7.00	8,600	7009.0	1401.8	103.2	86.0	......	81.5	16.3	1.2	1.0	......			

TABLE VI. Case 2. Norm. blood.															
Nov. 22, 1895	4.00 P. M.	6,500	4816.5	1209.0	390.0	84.5	......	74.1	18.6	6.0	1.8	......	4,340,000	80	The examinations recorded in this table were made when the patient was free from the influence of convulsions.
Dec. 31, 1895	4.00	7,400	5165.2	1657.6	458.8	118.4	......	69.8	22.4	6.2	1.6	......	4,500,000	80	
Jan. 2, 1896	3.00	5,700	4514.4	775.2	262.2	148.2	......	79.2	13.6	4.6	2.6	......	4,400,000	80	
Jan. 21, 1896	9.00 A. M.	8,400	6669.6	1310.4	336.0	84.0	......	79.4	15.6	4.0	1.0	......	3,640,000	70	
May 15, 1896	2.20	8,600	6295.2	1659.8	421.4	223.6	......	73.2	19.3	4.9	2.6	......	4,840,000	80	
Averages	....	7,320	5497+	1310+	873+	134.0	......	75.1+	17.9	5.1+	1.8+	......	4,344,000	78	
TABLE VII. Case 2.															
Sept. 11, 1896	4.45 P. M.	11,000	7986.0	1826.0	990.0	132.0	66.0	72.6	16.6	9.0	1.2	0.6	4,800,000	70	Convulsion of one minute's duration at 4.40 P.M.
	7.45	7,000	4767.0	1386.0	798.0	49.0	......	68.1	19.8	11.4	0.7	0.0	5,300,000	75	
TABLE VIII. Case 2.															
Sept. 14, 1896	7.25 A. M.	16,200	13138.2	1668.6	1314.6	.....	48.6	81.1	10.3	8.3	0.0	0.3	4,560,000	75	Twelve slight convulsions during the two hours preceding first count; they continued to occur until second count was made.
	10.30	24,600	21279.0	1574.4	1476.0	24.6	246.0	86.5	6.4	6.0	0.1	1.0			
TABLE IX. Norm. blood. Case 2.															
Sept. 12, 1896	7.45 A. M.	7,600	5266.8	1383.2	798.0	152.0	......	69.3	18.2	10.5	2.0	......	4,800,000	70	Patient quiet, but confused.
Sept. 13, 1896	5.30 P. M.	8,400	5653.2	1713.6	932.4	100.8	......	67.3	20.4	11.1	1.2	......	5,120,000	75	
Averages	....	8,000	5460.0	154.4	865.2	126.4	......	68.3	19.3	10.8	1.6	......	4,960,000	72½	
TABLE X. Case 3.															
Jan. 8, 1896	9.00 A. M.	21,500	19070.5	1741.5	645.0	43.0	......	88.7	8.1	3.0	0.2	0.0			
	11.00	12,100	10309.2	822.8	943.8	24.2	......	85.2	6.8	7.8	0.0	0.2	6,640,000	95	Four convulsions between one and two o'clock A.M., preceded by considerable muscular twitching.
	1.00 P. M.	11,200	9486.4	1075.2	593.6	44.8	......	84.7	9.6	5.3	0.4	0.0			
	3.00	12,600	10281.6	1348.2	894.6	75.6	......	81.6	10.7	7.1	0.6	0.0	5,600,000	95	
	5.00	8,400	6812.4	1083.6	445.2	58.8	......	81.1	12.9	5 3	0.7	0.0			
TABLE XI. Case 3.															
May 10, 1896	3.50 P. M	12,100	10272.9	750.2	1016.4	60.5	......	84.9	6.2	8.4	0.5	0.0	....	...	Convulsion began at 2.50 P.M., and lasted five minutes.
	5.30	16,000	14624.0	864.0	512.0	......	......	91.4	5.4	3.2	......	......	6,280,000	95	
	9.00	15,200	14196.8	425.6	501.6	......	76.0	93.4	2.8	3 3	......	0.5			
	11.00	21,600	19893.6	691.2	855.6	......	129.6	92.1	3.2	4.1	.....	0.6	5,200,000	95	
May 11, 1896	10.30 A. M.	11,400	10043.4	1014.6	262.2	79.8	......	88.1	8 9	2.8	0.7	......			
TABLE XII. Norm. blood. Case 3.															
Jan. 16, 1896	8.00 P. M.	7,000	5894.0	714.0	252.0	140.0	......	84.2	10.2	3.6	2.0	......	5,160,000	95	At the time that each of the specimens in this table was taken the patient was free from the influence of convulsions.
Feb. 22, 1896	7.00	8,600	7344.4	877.2	344.0	34.4	......	85.4	10.2	4.0	0 4	......	3,200,000	60	
Nov. 1, 1896	9.45 A. M.	8,000	6736.0	832.0	352.0	32.0	48.0	84.2	10.4	4.4	0.4	0.6	4,040,000	75	
Jan. 29, 1897	9.45 P. M.	6,200	4681.0	1035.4	353.4	131.2	......	75.5	16.7	5.7	2.1	......	4,680,000	80	
Jan. 29, 1897	10.45	6,000	4680.0	798.0	402.0	120.0	......	78.0	13.3	6.7	2.0	......	4,600 000	80	
Feb. 5, 1897	5.50	7,600	6163.6	1010.8	387.6	38.0	......	81 0	13.3	5.1	0.5	......	4,120,000	75	
Averages	....	7,233	5916.5	877.9	348.0	82.6	8.0	81.4	12.3+	4.9+	1.2+	......	4,300,000		

	Hour.	Leucocytes.	Actual number per c.mm.					Percentages.					Red corpuscles.	Hb. pr.ct.	Remarks.
			Polyn.	Lymph.	L.M.N.	Eosin.	Myelo.	Polyn.	Lymph.	L.M.N.	Eosin.	Myelo.			
TABLE XIII. Case 4.															
July 23, 1896	5.30 P. M.	18,400	16136.8	1380.0	736.0	36.8	110.4	87.7	7.5	4.0	0.2	0.6	5,600,000	100	Convulsion lasting five minutes began at 5.25 P.M.; this specimen was taken at close of twitchings.
	6.45	10,000	9210.0	530.0	250.0	10.0	......	92.1	5.3	2.5	0.1	......			
	7.45	9,200	8068.4	726.8	386.4	18.4	......	87.7	7.9	4.2	0.2	......			
TABLE XIV. Case 4.															
Sept. 20, 1896	8.30 P. M.	26,400	24446.4	712.8	1108.8	26.4	105.6	92.6	2.7	4 2	0.1	0.4	....	...	Ten or twelve convuls'ns occur'd between 11 A.M. and the first blood count; at 8.45 P.M. patient was etherized and kept under until 12 midnight; during this time convulsions were absent, but returned when ether was removed. Patient died at 5.50 P.M., Sept. 21st.
	10.00	22,600	21108.4	316.4	949.2	......	226.0	93.4	1.4	4.2	......	1.0			
	11.45	20,600	18828.4	700.4	1071.2	......	......	91.4	3.4	5.2	......	0.0			
Sept. 21, 1896	4.30 A. M.	22,000	19602.0	902.0	1452.0	......	44.0	89.1	4.1	6.6	......	0.2			
	10.30	33,000	27522.0	1386.0	389.0	......	198.0	83.4	4.2	11.8	......	0 6			
	4.50 P. M.	18,000	14886.0	1296.0	1314.0	......	504.0	82.7	7.2	7.3	......	2.8	7,400,000		
		......	......	......	......	......	......	......	......	......	......	......			
TABLE XV. Norm. blood. Case 4.															
Apr. 25, 1896	7.40 P. M.	8.600	6312.4	1255.6	894.4	137.6	......	73.4	14.6	10.4	1.6	......	4,680,000	85	Patient free from influence of convulsions.
June 26, 1896	6.50	8,200	6576.4	1328.4	246.0	49.2	......	80.2	16.2	3.0	0.6	......	5,280,000	90	
June 27, 1896	7.50	6,700	4777.1	1319.9	442.2	160.8	......	71.3	19.7	6.6	2.4	......	5,400,000	90	
July 4, 1896	7.30	7,200	5256.0	1461.6	374.4	108.0	......	73.0	20.3	5.2	1.5	......	5,120,000	90	
Aug. 7, 1896	8.15	8,200	6109.0	1853.2	164.0	73.8	......	74.5	22.6	2.0	0.9	......	4,840,000	90	
Averages	....	7,780	5806.3	1443.7	424.2	105.8	......	74.5	18.68	5.44	1.4	......	5,064,000	89	
TABLE XVI. Case 5.															
Feb. 15, 1896	4.35 A. M.	13,150	9139.3	2667.0	526.0	1117.7	......	69.5	18.0	4.0	8.5	0.0			
	6.30	11,800	10254.2	696.2	566.4	271.4	11.8	86.9	5.9	4.8	2.3	0.1	5,960,000	100	Convulsion of five minutes' duration at 4 A M.
	9.40	9,700	8623.3	649.9	291.0	135.8	......	88.9	6.7	3.0	1.4	0.0			
TABLE XVII. Case 5.															
Mar. 11, 1896	1.45 A. M.	20,500	11336.5	2685.5	4981.5	1496.5	......	55.3	13.1	24 3	7.3	0.0	4,000,000	80	A series of convulsions began at 12.35 A.M., Mar. 11th, and lasted until patient's death, at 10.05 A.M., March 17th; during this time he had one hundred and six convulsions. See chart.
	2.20	17,200	12642.0	602.0	3095.0	774.0	86.0	73.5	3.5	18.0	4.5	0.5			
	3.20	29,700	27205.2	772.2	1009.8	356.4	356.4	91.6	2.6	3.4	1.2	1.2			
	4.20	43,500	40107.0	609.0	2697.0	87.0	......	92 2	1.4	6.2	0.2	0.0			
	5.30	28,400	27690.0	85.2	26.0	56.8	142.0	97.5	0.3	1.5	0.2	0.2			
	6.30	24,400	23160.0	528.0	288.0	24.0	......	96.5	2.2	1.2	0.1	0.0			
	8.30	18,800	18010.4	526.4	225.6	37.6	......	95.8	2.8	1.2	0.0	0.2	3,720,000	70	
	10.30	16,800	15892.8	520.8	352.8	......	33.6	94.6	3.1	2.1	0 0	0.2			
	12.30 P. M.	14,200	13277.0	454.4	440.2	......	28.4	93.3	3.2	3.1	0.0	0.2	4,800,000	85	
	2.30	25,000	24300.0	250.0	325.0	......	125.0	97.2	1.0	1.3	0.0	0.5			
	5.00	18,700	17428.4	448.8	822.8	......	......	93.2	2.4	4.4	0.0	0.0			
	7.40	18,900	17898.3	396.9	585.9	18.9	......	94.7	2.1	3.1	0.1	0.0			
	11.40	19,400	18003.2	582.0	814.8	......	......	92.8	3.0	4.2	0.0	0.0			

Mar. 12, 1896	3.40 A. M.	18,300	17714.4	183.0	402.6	......	......	96.8	1.0	2.2	0.0	0.0			
	8.10	23,200	21367.2	533.6	1276.0	23.2	......	92.1	2.3	5.5	0.1	0.0			
	12.35 P. M.	28,200	25803.0	564.9	1833.0	......	......	91.5	2.0	6.5	0.0	0.0			
	2.40	16,800	15523.2	302.4	974.4	......	......	92.4	1.8	5.8	0.0	0.0	5,500,000	90	
	5.40	26,200	24916.2	419.2	864.6	......	......	95.1	1.6	8.3	0.0	0.0			
	10.00	21,300	19468.2	426.0	1405.8	......	......	91.4	2.0	6.6	0.0	0.9			
Mar. 13, 1896	2.00	17,800	16198.0	765.4	836.6	......	......	91.0	4.3	4.7	0.0	0.0			
	7.15	19,600	18404.4	411.6	725.2	......	58.8	93.9	2.1	3.7	0.0	0.3			
	10.20	20,200	19008.2	222.2	909.2	......	60.6	94 1	1.1	4.5	0.0	0.8	6,560,000	90	
	2.35	22,000	20416.0	462.0	1122.0	......	......	92 8	2.1	5.1	0.0	0.0			
	4.00	20,600	19199.2	370.8	988.8	......	41.2	93.2	1.8	4.8	0.0	0.2	6,400,000	100	
	7.20	21,200	19864.4	318.0	975.2	......	42.4	93.7	1.5	4.6	0.0	0.2			
Mar. 14, 1896	6.30 A. M.	17,800	16465.0	391.6	943.4	......	......	92.5	2.2	5.8	0.0	0.0	4,960,000	90	
	10 40	20,600	10631.8	309.0	494.4	.....	161.8	95.3	1.5	2.4	0.0	0.8			
	2.30 P. M.	20,400	19033.2	448.8	856.8	......	61.2	93.3	2.2	4.2	0.0	0.3			
	5.30	17,400	1660.2	261.0	1009.2	......	19.6	92.3	1.5	5.8	0.0	0.4			
	8.50	17,600	15910.4	704.0	932.8	......	52.8	90.4	4 0	5.3	0.0	0.3	4,640,000	95	
Mar. 15, 1896	2.00 A. M.	15,000	13785.0	450.0	720.0	......	45.0	91.9	3.0	4.8	0.0	0.3			
	6.00	15,400	13398.0	677.6	1278.2	......	46.2	87.0	4.1	8.3	0.0	0.3			
	9.30	15,100	13182.3	634.2	1208.0	......	75.5	87.3	4.2	8.0	0 0	0.5	5,880,000	90	
	4.40 P. M.	16,000	14464.0	592.0	832.0	16.0	96.0	90.4	3.7	5.2	0 1	0.6			
	9.30	14,900	13290.8	774.8	745.0	......	89.4	89.2	5.2	5.0	0.0	0.6			
Mar. 16, 1896	2.15 A. M.	15,400	14152.6	431.2	770.0	......	46.2	91.9	2.8	5.0	0.0	0.3			
	6.15	14,000	12180.0	434.0	1274.0	42.0	70.0	87.0	3.1	9.1	0.3	0.5			
	10.15	10,800	9196.2	572.4	1026.0	......	32.4	84.9	5.3	9.5	0.0	0.3	5,500,000	90	
	2.15 P. M.	11,200	9475.2	548.8	1176.0	......	......	84.6	4.9	10.5	0.0	0.0			
	7.00	11,000	9185.0	924.0	759.0	22.0	110.0	83.5	8.4	6.9	0.2	1.0			
Mar. 17, 1896	12.10 A. M.	9,200	7176.0	855.6	1094.8	18.4	55.2	78.0	9.3	11.9	0.2	0.6			
	6.00	11,800	9959.2	519.2	1038.4	70.8	212.4	84.4	4.4	8.8	0.6	1.8			
TABLE XVIII. Case 6.															
May 10, 1896	8.45 A. M.	14,000	11200.0	1820.0	952.0	28.0	......	80.0	13.0	6.8	0.2	0.0	5,200,000	95	Convulsion of two minutes' duration began at 8.30 A.M.
	9 45	10,800	8845.2	1188.0	756.0	10.8	......	81.9	11.0	7.0	0.1	0.0			
	10.45	13,200	10586.4	1874.4	739.2	......	......	80.2	14.2	5.6	0.0	0.0			
	2.45 P. M.	11,400	9553.2	1094.4	752.4	......	......	83.8	9.6	6.6	0.0	0.0			
	4.45	19,800	15760.8	2970.0	851.4	39.6	178.4	79 6	15.0	4.3	0.2	0.9	5,400,000	95	
	7.45	11,200	9430.4	963.2	705.6	100.8	......	84.2	8.6	6.3	0.9	0.0			
May 13, 1896	11.00 A. M.	10,400	8652.8	936.0	748.8	......	62.4	83.2	9.0	7.2	0.0	0.6	5,160,000	90	
TABLE XIX. Norm. blood. Case 6.															
Feb. 12, 1897	5.00 P. M.	8,200	4920.0	2525.6	656.0	98.4	......	60.0	30.8	8.0	1.2	......	4,560,000	75	Patient free from influence of convulsions when these specimens of blood were taken.
Mar. 19, 1897	3.45	7,600	4544.8	1082.4	881.6	91.2	......	59.8	27.4	11.6	1.2	......	4,960,000	80	
Mar. 21, 1897	10.30 A. M.	6 800	4379.2	1645.6	625.6	149.6	......	64.4	24.2	9.2	2.2	......	4,080,000	65	
Apr. 27, 1897	4.00 P. M.	7,400	4514.0	1938.8	673.4	273.8	......	61.0	26.2	9.1	3.7	......	5,320,000	70	
Apr. 26, 1897	5.05	7,000	4459.0	1561.0	763.0	217.0	......	63.7	22.8	10.9	3.1	......	5,120,000	70	
Averages	....	7,400	4563 4	1450.7	719.9	166.0	......	61.7+	26.1+	9.7+	2.2+	......	4,808,000	72	

TABLE XX. Case 7.	Hour.	Leucocytes.	Actual number per c.mm.					Percentages.					Red corpuscles.	No. nucleated red corpuscl. seen while counting 1000 leucocytes.	Remarks
			Polyn.	Lymph.	L.M.N.	Eosin.	Myelo.	Polyn.	Lymph.	L.M.N.	Eosin.	Myelo.			
Jan. 9, 1897	2.00 P. M.	25,200	23007.6	1436.4	630.0	......	120.0	91.3	5.7	2.5	0.0	0.5			A severe convulsion of two minutes' duration began 1.57 P.M.; writer with patient when convulsion began—third convulsion that occurred during the day. Spontaneous premature delivery of 7 months' infant occurred at 12.30 A.M.
	3.00	25,000	22600.0	1525.0	825.0	......	50.0	90.4	6.1	3.3	......	0.2	5,160,000		
	4.20	17,800	16411.6	729.8	605.2	......	53.4	92.2	4.1	3.4	......	0.3	5.240.000		
	5.45	18,800	16262.0	1071.6	1052.8	......	413.6	86.5	5.7	5.6	......	2 2	5,040,000	1	
Jan. 11, 1897	1.40	15,000	12540.0	1215.0	975.0	105.0	165.0	83.6	8.1	6.5	0.7	1.1	4,780,000	4	
	2.30	15,100	12487.7	1192.9	875.8	211.4	332.2	82.7	7.9	5.8	1.4	2.2	4,860,000		
Jan. 12, 1897	12.00 M.	13,200	10454.4	1544.4	937.2	66.0	198.0	79.2	11.7	7.1	0.5	1.5	4,520,000	2	
Jan. 13, 1897	12.30 P. M.	32,400	27799.2	1782.0	1198.8	......	1620.0	85 8	5.5	3.7	......	5.0	3,200,000	1	
Jan. 14, 1897	12 00 M.	25,000	20025.0	1650.0	925.0	150.0	2250.0	80.1	6.6	3.7	0.6	9.0	2,600,000		
Jan. 15, 1897	12.30 P. M.	15,800	13272.0	1501.0	647.8	110.6	268.6	84.0	9.5	4.1	0.7	1.7	3,640,000		
Jan. 16, 1897	12.15	15,400	12243.0	1694.0	1001.0	246.4	215.6	79.5	11.0	6.5	1.6	1.4	3,240,000		
Jan. 18, 1897	12 30	53,600	9683.2	2434.4	1020.0	204.0	258.4	71.2	17.9	7.5	1.5	1.9	3,380,000	1	
Jan. 19, 1897	12.30	11,800	8177.4	1970.6	896.8	247.8	507.4	69.3	16.7	7.6	2.1	4.3	2,880,000	5	
Jan. 21, 1897	11.30 A. M.	11,200	9329.6	1131.2	280.0	123.2	336.0	83 3	10.1	2.5	1.1	3.0	2,600,000		
Jan. 23, 1897	12.00 M.	12,600	8857.8	2079.0	919.8	163.8	579.6	70.3	16.5	7.3	1.3	4.6	3,680,000	1	
Jan. 25, 1897	12.30 P. M.	9,000	6498.0	1413.0	747.0	153.0	189.0	72·2	15.7	8.3	1.7	2.1	3,240,000	2	
Jan. 30, 1897	4.00	7,200	4658.4	1634.4	662.4	115.4	129.6	64.7	22.7	9.2	1.6	1.8	3,880,000		
Feb. 5, 1897	2.00	8,000	5376.0	1480.0	808.0	232.0	104.0	67.2	18.5	10.1	2.9	1.3	3,720,000	1	
Feb. 13, 1897	12.15	8,600	5701.8	1849.0	799.8	215.0	34.4	66.3	21.5	9.3	2.5	0 4	4,680,000		
TABLE XXI. Norm. blood. Case 7.														Hb. per cent.	
June 15, 1897	2 15 P. M.	8,200	5362.8	1582.6	1082.4	172.2	......	65.4	19.3	13.2	2.1	0.0	5,400,000	50	The examinations recorded in this table were made when the patient was free from the influence of convulsions.
	3.15	6,800	4576.4	1591.2	496.4	136.0	......	67.3	23.4	7.3	2.0	......	5.360,000	50	
June 19, 1897	10.00 A. M.	7,400	4580.6	1709.4	910.2	199.8	......	61.9	23.1	12.3	2.7	......	5,440,000	55	
	11.00	7,000	4585.0	1491.0	728.0	196.0	......	65.5	21.3	10.4	2.8	......	5,200,000	55	
June 21, 1897	3.00 P. M.	7,500	4777.5	1837.5	697.5	187.5	......	63.7	24.5	9.3	2.5	......	4,900,000	55	
Averages	....	7,380	4776.5	1642.3	782.9	178.3	......	64.7+	22.5+	10.5+	2.4+	......	5.260,000	53	
TABLE XXII. Frenzy of gen. paralysis Case 8.															
Apr. 19, 1897	9.15 A. M.	16,600	10922.8	4863.8	747.0	66.4	......	65.8	29 3	4.5	0.4	......	4,800,000	....	No convulsion, but patient in great excitement during an attack of frenzy.
	12.30 P. M.	10,000	6670.0	2720.0	420.0	190.0	......	66.7	27.2	4.2	1.9	......			
Apr. 29, 1897	4.30	6,400	4134.4	1683.2	505.6	76.8	......	64.6	26.3	7.9	1.2	......			
May 2, 1897	4.00	6,200	4346.2	1221.4	508.4	124.0	......	70.1	19.7	8.2	2.0	......	4,360,500		
TABLE XXIII. Exercise. Case 9.															
June 21, 1897	9.30 P. M.	13,000	9919.0	2093.0	819.0	169.0	......	76.3	16.1	6.3	1.3	......	....	....	This is a leucocytosis of exercise.
	10 00	17,000	10268.0	3706.6	2601.0	425.0	......	60.4	21.8	15.3	2.5	......			
	10.20	11,400	6954.0	2815.6	1356.6	273.6	......	61.0	24.7	11.9	2.4	......			
	11.00	8,800	5051.2	2050.4	1584.0	114.4	......	57.4	23.3	18.0	1.3	......			
	11.30	8,900	5642.6	1824.5	1343.9	89.0	......	63.4	20.5	15.1	1.0	......			

There remains, therefore, a pathological leucocytosis which is not explained by the muscular work done during the convulsion. It is to be regretted that we have practically no information concerning the condition of the blood immediately before a convulsion. In one of Capps's cases there seemed to be a fall of the leucocytes an hour before the convulsion; in one of our cases this did not occur one and a half hours before the convulsion. (See Table II.) The question is, therefore, still an open one. The case with very numerous convulsions does not help us in this respect, on account of the frequency of the convulsions. The occurrence of a fall in the leucocytosis would be in accord with the observations that there is at times a fall in the number of leucocytes in other diseases before the occurrence of a leucocytosis.

We see from this study that leucocytosis associated with convulsions is by no means confined to general paralysis, but occurs in other diseases as well, and has been found in a case of catatonia where the convulsions were more of a hysterical character, and in part, at least, not associated with loss of consciousness. It would certainly be interesting to study the blood in convulsions of still other diseases, especially hysteria and epilepsy.

While this study, therefore, does not furnish data of diagnostic value, the fact of the existence of a leucocytosis in a condition still so obscure in its pathogenesis as convulsions is of interest, since the studies of leucocytosis, especially those of Goldscheider and Jacob,[7] have made the explanation very probable that the origin of leucocytosis is to be sought in the presence of a chemotaxic substance circulating in the blood.

CONCLUSIONS. This study has shown that there is a leucocytosis associated with convulsions, not only in general paralysis, but in various other diseases as well, and that the leucocytosis bears a relation to the severity of the seizure. It has further shown that this leucocytosis is in part due to the muscular work done during a convulsion—a part, which owing to its "physiological" character and its short duration, has been shown to be superimposed upon a pathological leucocytosis of longer duration.

I wish to thank Dr. Cowles for the use of the clinical material and for the facilities for study afforded me during my service at the McLean Hospital. My thanks are equally due to Dr. Hoch for valuable instruction and advice in the prosecution of this study.

EXPLANATION OF THE TABLES. The tables are arranged in the order in which the cases are considered in the text. First, the abnormal, and following that the normal blood of each patient is given.

The percentages were calculated by counting 1000 leucocytes in each instance.

The following abbreviations are used in the tables:

Polyn.—Polymorphonuclear neutrophiles.
Lymph.—Lymphocytes, or small mononuclear elements.
L. M. N.—Large mononuclear elements.
Eosin.—Eosinophilic leucocytes.
Myelo.—Myelocytes (elements not found in normal blood).

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A CASE OF BRAIN TUMOR AT THE BASE OF THE SECOND LEFT FRONTAL CONVOLUTION,

WITH AUTOPSY; THE ONLY POSITIVE LOCALIZING SYMPTOM WAS AGRAPHIA UNCOMBINED WITH ANY FORM OF APHASIA.

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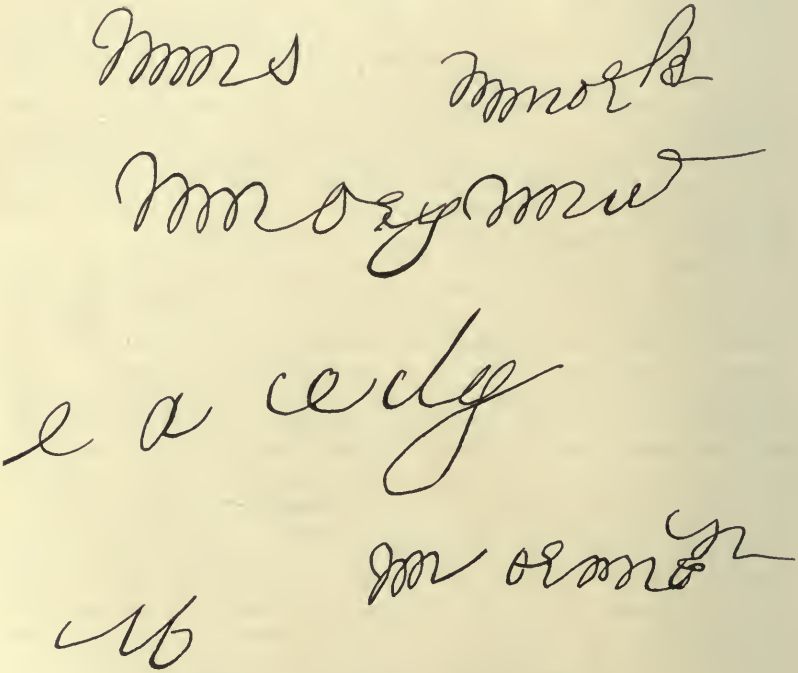
THIS very interesting and instructive case, the like of which I have not been able to find in medical literature, seems to prove the existence of a separate and distinct cortical centre for writing, having the same relation to writing movements as the motor speech centre has to speech movements. This centre is localized at the base of the second left frontal convolution for the right-handed, there probably being a centre of like character in the same location of the opposite cerebral hemisphere for the left-handed. Destruction of this centre produces pure motor agraphia without aphasia, and with no paralysis of the arm. It has long been supposed by Exner and his followers that such a distinct cortical centre existed, and its location was believed to be in close proximity to the motor speech centre, and probably at the base of the second left frontal convolution. But two cases of value have been recorded which support such a belief—those of Charcot and Dutil, and Eskridge, the latter being the nearest approach to the necessary requirements for the positive location of a writing centre in the above-mentioned position. In several cases of motor aphasia combined with agraphia that have come to autopsy the base of both the second and third frontal convolutions have been found diseased. A few cases of pure motor aphasia without agraphia have been recorded, the lesion being confined to the base of the third left frontal gyrus.

The patient, Mrs. Lizzie W., an intelligent Irish woman, received her education in the public schools. Her age is thirty-seven years, and she has been married for fifteen years. Has had five living children and one miscarriage at the third month. Her father died at the age of sixty years, of cancer of the face. Mother alive and in perfect health. Has a brother and sister living and in good health. Has lost two sisters, one of Bright's disease, the other from consumption. The patient had always enjoyed excellent health up to the onset of the present illness, which began about Christmas, 1897, when she began to fail in strength, and had several attacks of vertigo, without falling and unattended with nausea or vomiting. A short time afterward she developed severe frontal and occipital headaches, with occasional attacks of vomiting. The headaches continued with increasing severity until the fatal issue. In March, 1898, she noticed that her sight was failing, and that she could not read print without the use of glasses. At about the same time she began to complain of a numbness in the right arm. At no time during her illness did she have a unilateral or general convulsion. Her bowels have been rather constipated; she has had perfect control over her bladder. Has menstruated regularly and in a normal manner. Patient converses intelligently, makes no errors, and her memory for past and recent events is good. At no time during illness has she had the slightest difficulty in giving expression to her thoughts by articulate speech.

Examination, April 5, 1898: Patient 5 feet 4 inches in height, weight 140 pounds. Physical examination of the chest and abdomen elicited nothing abnormal. Urine normal; temperature 98.6° F.; pulse 68. Head well formed and perfectly symmetrical; no evidence of previous injury; no exostosis; percussion of scalp elicits no tenderness. Veins of forehead not prominent. Pupils moderately and equally dilated. Respond actively to light and accommodation. Wernicke's hemiopic pupillary phenomenon present. No hemianopsia; optic neuritis of both eyes, though most intense in right eye. Owing to paresis of the right external rectus muscle the right eyeball could not be rotated outward, but its movements upward, downward, and inward were found normal. Diplopia existed. Excursion of left eyeball normal. Color vision normal. Drum membranes appeared normal, hearing distance for watch in each ear was three feet. Movements of tongue normal, no fibrillation or atrophy. Senses of taste and smell normal. Soft palate and uvula move in a normal manner. No loss of sensation over buccal or pharyngeal mucous membranes. Movements of vocal cord perfect, no difficulty in swallowing. No stiffness of neck muscles or those of spine. Both sides of face symmetrically formed, no evidence of facial paralysis. Patient is able to perform in a normal manner symmetrical bilateral movements. Grip of right hand is slightly weaker than that of left. Dynamometer: outer scale, right, 50; left, 75. No muscular atrophy anywhere discoverable. No stiffness of muscles. Both fine and coarse movements of right and left hands and arms normal. Movements of lower extremities normal, the strength of both sides being alike. The most careful examination of the skin of the entire body showed no sensory disturbances. No œdema or other vasomotor changes. The most careful reinforcement failed to elicit the presence of patellar tendon reflexes.* No ankle clonus, superficial reflexes present, not exaggerated. No ataxia in upper or lower extremities. The sense of posture normal. Romberg's symptom absent. Patient's gait is perfectly normal. She has always been right-handed.

Speech. Patient recognizes and names correctly any object placed before her. She can recognize and accurately name, with her eyes closed, any familiar object when placed in her right hand, such as coins and the like. She understands perfectly what is said to her. She recognizes familiar hymns. She can repeat words after another, and speaks voluntarily without the slightest hesitation, and always correctly. She can read correctly with the aid of glasses ordinary sized print or writing. She recognizes numerals at once. The only difficulty present is a total inability to write. Although she understands perfectly written language and can read to herself or aloud, she cannot write voluntarily nor form correctly a single letter, and cannot write from dictation or copy. She holds the pen in a perfect manner, and performs movements with it as if to write, her writing consisting, however, of nothing more than a series of united curves. (Fig. 1). She was unable to write with her left hand, as she was not ambi-dextrous. The fine and coarse

FIG. 1.



An attempt to write her name—"Mrs. Lizzie Warwick."

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* This absence of the deep reflexes has been noted by several observers in tumors of the frontal lobe.

muscular movements of the right hand are executed in a perfect manner, and there exists no paralysis of the muscles of the hand, forearm, or arm. Before the present illness began she could write perfectly. She showed me some of her writing, which was excellent.

Without the slightest external manifestation of a syphilitic infection, it was thought wise to give the patient the benefit of the doubt, and hence potassium iodide combined with mercury was administered for six weeks.

May 20th. After six weeks' continuous use of increasing doses of potassium iodide combined with mercury it was discontinued, there having been no amelioration of any symptom. No sensory or motor symptoms. No hemianopsia or alexia, voluntary speech perfect. Cerebration, which was very active at my first examination (the patient answering the numerous questions put to her very quickly and correctly), was now quite slow. This slowness of speech was not in any sense aphasic in character, as all questions were answered correctly, only there was considerable deliberation before the answers came. Memory good. There is an absolute inability to write voluntarily from dictation or to copy. The patient holds the pen or pencil in perfect position, and the movements of the forearm and hand are normal. Perfect control over sphincters. In no other particular was her condition different from that denoted above, save that there is a tendency to fall or to stagger toward the right side. This ataxia did not exist at the date of the first examination. The patient has noticed this condition for about three weeks, and she thinks it is becoming gradually worse. It is an inco-ordination similar to that of cerebellar disease, and is like that frequently observed in disease involving the prefrontal lobe.*

This condition of complete agraphia continued throughout her illness, and was, with the exception of a gradual development of a slow cerebration and frontal ataxia (Bruns), the only localizing symptom present. At no subsequent time was there found the slightest evidence of motor or any form of sensory aphasia. She never had a partial or complete unilateral or general convulsion, never became paralyzed or developed any sensory disturbance. Hemianopsia or alexia were never present. The presence of agraphia without motor aphasia, with a gradually increasing slow cerebration and ataxia, coupled with double optic neuritis, with severe and continuous headaches, unaccompanied with alexia, led to the diagnosis of a lesion of the prefrontal lobe, probably a new growth, the situation of which I was led to believe, owing to the fact that the slow cerebration and inco-ordination which developed subsequently to the agraphia, was at the base of the second frontal convolution of the left side.

After six weeks of further suffering, there being no change in her symptoms, she consented to an exploratory operation, which was performed July 19, 1898, by Dr. E. D. Ferguson, of Troy, N. Y. The left Rolandic area was exposed after the method of Reid, under strict asepsis. A trephine opening was next made through the middle third of this area. On removing the button of bone the dura bulged into and through the opening, forming a very elastic swelling, which pulsated feebly. On incising the dura there was an escape of a considerable amount of sub-arachnoid fluid, followed immediately by the formation of a troublesome hernia cerebri. The opening was now enlarged forward by the Ronguer forceps, and a careful search was made for a lesion, but none was detected. The cortical area exposed by trephine opening appeared normal. While discussing the propriety of enlarging the openings still more forward her condition became so alarming that it was decided to close the opening at once.

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* The inco-ordination or ataxia which has been so frequently observed as a result of lesions of the frontal lobe is similar in character to that observed in cerebellar disease. The causation of this frontal ataxia is not as yet known. Wernicke, Oppenheim, and Bruns believe it to be due to the involvement of the centre for the trunk muscles, which centre has been placed by Monk in the posterior part of the prefrontal lobe. They think that it is not a true ataxia, but is a loss of equilibrium, the result of paresis of the trunk muscles.

This inco-ordination may possibly be attributable, as suggested by Bruns, to a partial or complete interruption of the fibres of the fronto-cerebellar tract, which brings into association the prefrontal lobe with the opposite cerebellar hemisphere.

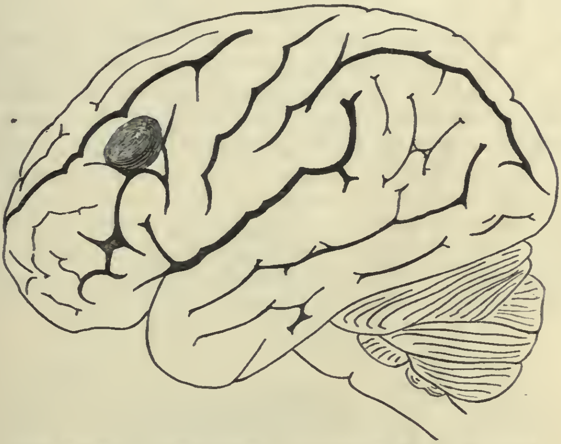
The vessels having been secured, the wound was closed with kangaroo-tendon, a gauze drain being left in the most dependent part.

July 20th, 1898. On awakening from her etherization it was discovered that her right arm was paralyzed. She appeared very drowsy and stupid, and complained of great pain in the region of the wound. She was unable to move the right arm, and the movements of the right leg were impaired.

July 21st. Patient rapidly passed into a condition of unconsciousness. No control over bladder; pulse rapid and very feeble; temperature 101°; expired at 4 P.M.

Autopsy, July 22, 1898, at 10.30 A.M. Only the head permitted to be examined. Trephine opening 4.5x4.75 cm. Elevation of hernia cerebri above dura was 2 cm. Dura everywhere free. Superior longitudinal sinus contained a soft, recent thrombus. Vessels of pia injected. Left cerebral hemisphere. Marked hemorrhagic softening of the hernia cerebri and surrounding brain tissue; pia not adherent save at location of new growth, which was found occupying the foot of the second left frontal convolution, being distinctly separated from the arm area by the precentral sulcus, which sulcus in this case was well developed. (Fig. 2.) The growth was elevated about one-half centimetre above the surrounding cortex; was slightly irregular in outline, of a distinctly firm consistency, and oval in shape. Its longest cortical diameter was 2 cm. The pia was intimately adherent to it. On section the tumor was seen to extend downward and inward in the centrum semi-ovale as far as the roof of the anterior cornu of the lateral ventricle, and forward to near the apex of the frontal lobe, involving almost exclusively the white matter of the second frontal gyrus. (Fig 3.) The left third or inferior frontal convolution throughout its whole extent was found (macroscopically) perfectly normal, as was its associated centrum ovale. The centrum ovale of the superior or first frontal convolution was toward its ventral part infiltrated by the growth. The motor convolutions in their middle third formed a part of the hernia cerebri; this area was filled with minute capillary hemorrhages, the result of the sudden relief of the intracranial pressure, resulting in a hemorrhagic softening. The rest of the motor area and the underlying white matter was found normal. The supramarginal and angular gyri, with their associated white matter, were very carefully examined and found normal, as were the convolutions and white matter of the occipital and temporal lobes. The basal ganglia and the internal capsule showed no naked-eye changes. The convolutions, centrum ovale, basal ganglia, and internal capsule of right cerebral hemisphere normal. The interior of the skull was found normal.

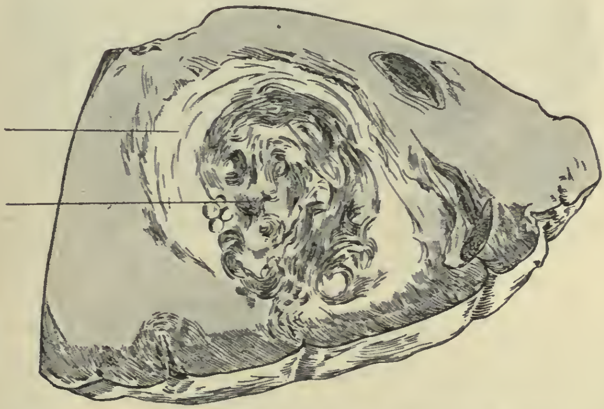
FIG. 2.



Diagrammatic representation of the cortical part of the tumor.

Histological examination. The histological examination of the tumor shows it to be a glioma of rapid growth. It is of a yellowish-gray color, rather firm in consistency, not very vascular, and is inseparably blended with the surrounding white matter. It presented no softened areas, and there is no softening of the white matter in advance of it. It is not at all cystic in character. Sections of the tumor were placed for four days in Orth's fluid and subsequently hardened in alcohols of increasing strength. Small cubes were embedded in celloidin and stained with hæmatoxylin and eosin, van Giesson's picric acid fuchsin

FIG. 3.

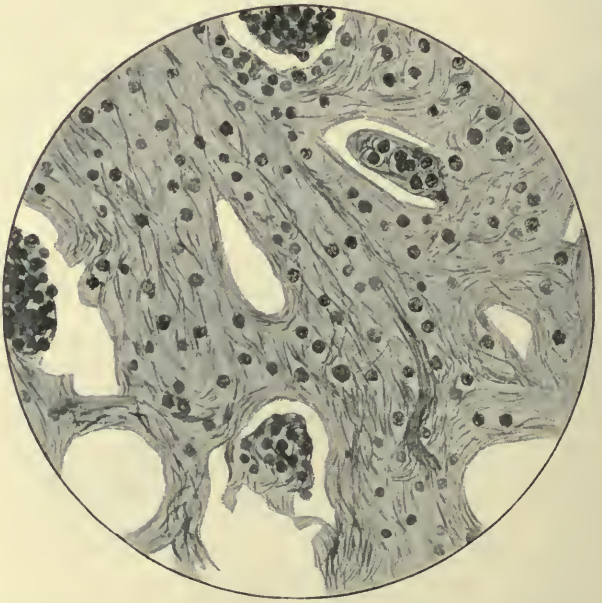


Transverse or frontal section through left præfrontal lobe, showing location of tumor in centrum semiovale of second frontal convolution.

and hæmatoxylin, Weigert's myeline stain, and with Mallory's phospho-molybdic acid hæmatoxylin and phospho-tungstic acid hæmatoxylin.

With a low power the growth is seen to be composed chiefly of a rather dense matrix of fibrillated tissue arranged into bundles of coarse and fine fibres. These fibres have no special direction, but course in various ways around and between the cells, the latter being arranged both in groups or distributed singly between the fibres. Bloodvessels are not very abundant, but are sparsely scattered throughout. Many of them present no thickening of their walls, while others show a distinct thickening, the result of a proliferation of their spindle-cells. In some situations between the bundles of fibres exist rather large, mostly circular, spaces, some being empty, while others were filled with a hyaline-appearing substance, which stained poorly and contained a few roundish cells the size of small leucocytes. Similar spaces have been observed by Taylor* in a gliomatous growth, and he thinks that they may be lymphatic in their nature.

FIG. 4.



Section through the oldest part of tumor, showing dense reticulum of neuroglia fibres, with many neuroglia cells. Van Giesson's picric acid fuchsin method. Zeiss ocular 4. Objective 4 mm.

With a high-power, Zeiss apochromatic objectives 4.0 mm. and 2.0 mm , ocular 4, sections stained after the methods of van Giesson and Mallory show this mass of reticulated or fibroid-appearing tissue to consist in places of a dense and in places of a loose reticulum of coarse and fine neuroglia fibres, between which exist three distinct varieties of cells. The neuroglia in the older parts of the growth is arranged into dense bundles of rather coarse, evidently enlarged, fibres, between which bundles are groups of cells variable as to size and of a round or oblong shape. (Fig. 4.) These cells were granular, and contain small, mostly eccentrically placed, nuclei. About the bloodvessels existed an infiltration of nucleated round-cells, evidently escaped leucocytes. In the more recently infiltrated parts—*i. e.*, at the periphery of the growth and toward the adjoining white matter—one sees a preponderance of neuroglia fibres, much finer in character, interlacing with one another and forming a rather loose meshwork, between the fibres of which exist two forms of cells, those with and those without processes. (Fig. 5.) Those with processes are of an elongated spindle-shape, and give off at one or both poles fine, attenuated, mostly unbranched processes one or more times the length of the cell-body. Those without processes are round or oblong in shape, and placed between the differentiated neuroglia fibres. All these cells consist of a body of protoplasm, with usually a single nucleus placed toward its periphery. Typical neuroglia cells of the type of Deiter, with processes radiating from all parts of the cell-body, were not found. Normal ganglion cells were likewise unobserved in the growth.

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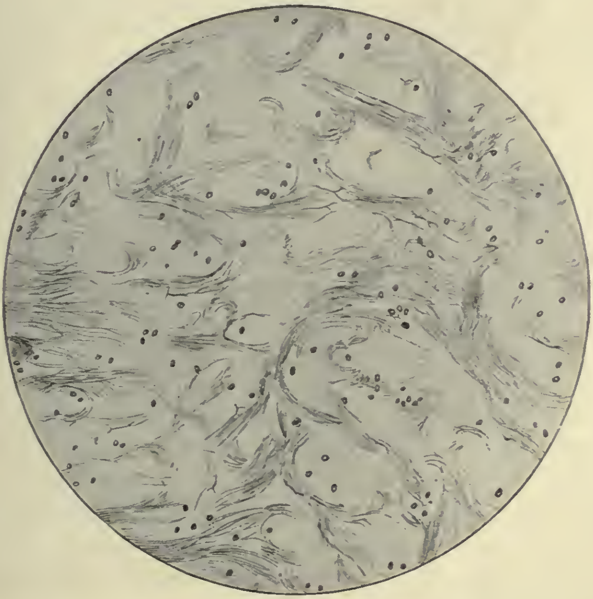
* Journal of Experimental Medicine, November, 1897, page 611.

FIG. 5.



Section through the more recent part of the tumor, showing abundance of neuroglia fibres, with sparsely scattered cells. Mallory's phospho-tungstic acid hæmotoxylin stain. Reichert ocular 2. Objective $^1/_5$.

Microscopical examination of the left inferior or third frontal convolution, with its associated white matter, showed it to be normal.

The ventricles contained an excess of fluid. The brain stem, pons, cerebellum, medulla, and cranial nerves showed no macroscopic changes.

The question as to whether or not a separate and distinct centre for writing exists in the cerebral cortex has long been under discussion. Trousseau,[1] Jackson,[2] and Gairdner were among the first to approach the subject, they being led to believe, from the fact that agraphia and motor aphasia were so often associated, that writing was performed only through the medium of Broca's speech area, and that a separate and distinct centre for writing did not exist.

At the present time Déjèrine[3] is the most ardent advocate of the theory of the above-mentioned observers, even going so far as to cite cases in support of this view. His reports are, however, not at all conclusive, since no symptoms occurred which were not explicable in some other way. It is especially noticeable that several of the cases which he considers most positive never came to autopsy. Contrary to the view of the above-mentioned observers are the interesting cases, with autopsies, of Guido Banti,[4] Wadham,[5] and Byrom Bramwell.[6] In all of these typical motor aphasia existed without agraphia, and on autopsy only Broca's area was destroyed. Oppenheim,* of Berlin, has recorded a case of pure motor aphasia in which the patient was able to say only the words yes and no, but could write and paint through his entire illness. We can readily see, as pointed out by Bastian,† how a destructive lesion of Broca's centre can affect by extension the base of the second left frontal gyrus which lies just above it, and thus produce a symptom-complex with motor aphasia and agraphia. Several such cases with autopsies are now on record, among which may be mentioned the very interesting cases of Tamburini and Marchi,[7] and Simon.[8] On the other hand, we can readily conceive of a lesion affecting only the base of the second left frontal convolution and giving a complete agraphia as the sole localizing symptom. The wonder is that such cases have not been more frequently observed. Approximating such an ideal case are those of Charcot and Dutil[9] and Eskridge.[10]

The case of Charcot and Dutil seems perfectly simple if we could but prove that the oldest focus of softening was at the base of the second left frontal gyrus, which the clinical symptom agraphia indicates.

The case of Eskridge is much more complex and difficult of explanation. The patient exhibited, instead of pure agraphia, an inability to spell correctly, resulting in an unintelligible handwriting. At no time during his illness was he unable to form letters correctly; his difficulty was in transposing letters, words, and phrases. He realized his errors, but was unable to correct them, often making greater mistakes in such attempts. In addition to this it is extremely difficult to be positive of the exact boundaries of any cortical lesion by an examination through a trephine opening, as it is at times no easy matter to be perfectly sure of the exact position of certain fissures and gyri, even when the brain is removed and stripped of its pia.

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* Oppenheim. Lehrbuch der Nervenkrankheiten, p. 458.

† Aphasia and other Speech Defects. Bastian.

In the author's case there can be no room for doubt that the cause of the complete agraphia was the destruction of the base of the second left frontal convolution, and that the slow cerebration and frontal ataxia which was developed later was due to the extension of the process further into the frontal lobe. The paralysis of the right external rectus muscle may have been due to the involvement of the area for the movements of the eyes and head, which is supposed, from experimentation and clinical verification, to be at the base of the first and second frontal gyri. It is a well-known fact that a lesion limited to the left angular gyrus will produce agraphia, but the agraphia is always accompanied with alexia, the agraphia being due to a loss of the activity of the left angular gyrus, which is necessary for the production of the memories of the appearance of written or printed words. Numerous cases with autopsies have been recorded to verify the above-mentioned statement, among which may be mentioned the cases of Bateman,[11] Amidon,[12] Hun,[13] Bernheim,[14] and Sigaud.[15]

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SARCOMA OF THE TESTICLE.

CONCLUSIONS BASED UPON ONE HUNDRED AND FOURTEEN CASES.

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PROFESSOR GURLT, in his onkological statistics, tells us that of 16,637 tumors which came under observation in the Vienna hospitals from 1855 to 1878, there were 11,131 cases of carcinoma and 848 sarcomas. Of the carcinomas 64, and of the sarcomas 45, involved the testis. On account of the comparative infrequency of sarcoma of the testis, and an evident lack of statistical material based upon full clinical histories, I have collected all the cases I could find in German and English literature reported during the past eighteen years, with the hope of supplying some of the missing data.

Green and other pathologists hold that sarcomas are tumors consisting of connective tissue of a more or less embryonic type—in so far, at least, that cells predominate over intercellular tissue; and, since they always spring from connective tissue, they may occur wherever connective tissue is present, but it is still doubtful whether these growths start from adult tissue or from some embryonic remnant.

Certain histological and clinical differences have induced pathologists to divide sarcomas into several varieties. Thus, according to the predominant form of cell, we have four groups, viz., the round-celled, the spindle-celled, the mixed-celled, and the myeloid-celled. In the mixed-celled no special form predominates, and even the myeloid-celled is, strictly speaking, a mixed-celled sarcoma; but as the myeloid cells are frequently the most striking and numerous objects in the field, Green prefers to speak of it as a distinct group.

The nature of the stroma, whether mucus, fibrous, cartilaginous, or bony, has given rise to the names myxo-, fibro-, chondro-, and osteosarcoma; and since sarcomas may undergo secondary changes, and the chief peculiarities are reproduced in the secondary growths—as, for instance, the development of black or green pigments or fatty or calcareous infiltration—such varieties as melanosarcoma, chloroma, liposarcoma, and calcifying sarcoma have been recognized.

In addition to these the term medullary, encephaloid, or soft sarcoma is used: but they are only different names for the round-celled variety, which are of a softer consistence than the spindle-celled growth and often confounded with encephaloid cancer. The lymphosarcoma and alveolar sarcoma also belong to the round-celled variety, while in cystic sarcoma, in addition to the formation of a cyst there is also the development of sarcomatous elements in the structure of the growth. Sarcomas are classed among the most malignant new formations, and, as they infiltrate the surrounding structure, are apt to recur *in loco* after removal. This, however, does not appear to be the case with sarcoma of the testis, since of 114 cases tabulated by the writer the disease returned in the scrotum or in the inguinal canal in only eight instances (see Case VI. of my own collection, and Nos. 16, 42, 45, 77, 89, 106, and 107), and in these it may be assumed that there was an adherent scrotum or thickened cord at the time of the operation.

Generally speaking, the soft, round-celled, and large spindle-celled varieties are much more malignant and more liable to reproduce themselves in distant parts than the firmer, small spindle-celled growths.

Sarcomas, unlike carcinomas, usually show no tendency to affect the lymphatic glands; yet in the testicle, especially in young subjects, as first pointed out by Butlin, the disease involves the nearest glands with greater frequency than when it is situated in any other part of the body, unless it be the tonsil or some lymphatic gland. Indeed, from the frequency of abdominal metastasis, especially of the retro-peritoneal glands, we may conclude that in sarcoma of the testis the method of extension is similar to that of carcinoma; but, as in cancer, so here the dissemination may also be effected by means of the blood, as shown by the frequent secondary growths in the lungs, kidneys, spleen, and other parts of the body. The secondary tumors usually resemble the primary growths, but the several varieties may replace one another.

CAUSES. Injuries—such as blows, contusions, and squeezes, especially against the pommel of the saddle or in coitus—have been regarded as exciting causes of sarcoma of the testis; and in 32 of the 114 tabulated cases there is a distinct history of traumatism. In 18 cases the disease developed in retained testicles, or when the descent had been delayed; in one instance the retained testicle had been subjected to the additional pressure of a truss; in 2 cases there was a syphilitic history; in one instance the history shows mumps, with metastasis to a non-descended testicle; four of the cases were complicated with hernia, while in the others no special etiological factors are given. In the majority of the cases there is no history of traumatism, and in many of these the reporters assume that the patients were subjects of some new-growth diathesis.

The history of traumatism and retained testicle in 43 per cent. of the tabulated cases is of interest as tending to confirm the conclusions of pathologists that an injury or irritation may call into activity some fœtal relic or germinal rudiment, hitherto quiescent, or that the growth of the tumor may be due to some arrest in the development of the reparative material, which at a certain stage resembles more or less closely the tissue of sarcoma.

AGE. Senn quotes Virchow as maintaining that sarcoma of the testis is most frequent in boys and in old men. I have not been able to verify this quotation; but in 107 of the 114 cases collected by me the ages were specified and were given as follows:

Age.	*Cases.*
3 months	1 [No. 49]
8 "	1 [" 50]
11 "	1 [" 51]
2 years	2 [" 45, 75]
2½ "	1 [" 98]
3 "	1 [" 66]
5 "	1 [" 44]
6 "	1 [" 99]
10 "	1 [" 79]
10-15 "	None.
Total	10

Age	*Cases.*
16 to 20 years	6
21 " 30 "	25
31 " 40 "	25
41 " 50 "	26
51 " 60 "	6
61 " 70 "	6
71	1 [No. 42]
74	2 [" 54, 81]
Total	97

From this tabulation we conclude that only 9.3 per cent. of sarcoma of the testis occur between birth and the age of ten years. None of the cases occurred between the age of ten and fifteen; 5.6 per cent. occurred between the age of sixteen and twenty; 71 per cent. between the ages of twenty and fifty, and about 14 per cent. after the age of fifty.

In 21 of the 114 tabulated cases the seat of the disease was not specified; of the remaining 93 cases the tumor involved the right testicle in 47, the left in 41, and in five instances both testes (Nos. 1, 30, 45, 54, 83).

Varieties. In 39 of the 114 cases the histological character of the sarcoma was not specified; but as most of these cases occurred since 1880, and were reported from the well-known clinics of Berlin, Halle, Würzburg, and Greifswald, and by competent surgeons elsewhere, the general diagnosis of sarcoma may be accepted as correct. In the 75 cases in which the tumor was examined microscopically the classification was as follows:

Round-celled or medullary sarcoma	31	or	42.6	per cent.
Small round-celled sarcoma	9	"	12	"
Round and spindle-celled or mixed sarcoma	8	"	10.6	"
Cystic sarcoma	8	"	10.6	"
Alveolar sarcoma	7	"	9.3	"
Spindle-celled sarcoma	5	"	9	"
Lymphosarcoma	1			
Adenosarcoma	1			
Myxosarcoma	1			
Melanosarcoma	1			
Angiosarcoma	1			
Fibrosarcoma	1			
Myxochondrofibrosarcoma	1			
Total	75			

Symptoms and Course. Sarcoma, like carcinoma of the testis, develops rather rapidly, although a few remarkable exceptions showing a very slow growth of the tumor will be noted in the summary. Of 99 cases in which the duration of the tumor was stated it was as follows:

Congenital origin (Nos. 49, 50, 79, and probably 51 and 92)	5	cases.
From a few weeks to 6 months	28	"
" 7 months to 11 months	14	"
" 1 year to 2 years	24	"
" 2 years to 5 years	18	"
Of 6 years' duration	2	"
" 15 " "	2	"
" 16 " "	1	"
" 20 " "	3	"
" 23 " "	1	"
" 26 " "	1	"
Total	99	

In most of the histories we find that the patients observed a gradual but painless enlargement of the testicle, lasting for an indefinite time, followed by a period during which, in the course of a few weeks, the tumor developed very rapidly, accompanied by a dull, aching, and sometimes lancinating pain. The rapid growth and the symptoms just referred to, together with a sensation of a dragging weight in the groin and loin, usually alarm the patient and induce him to seek surgical advice; but the innate modesty of man often deters him until the tumor has attained the size of an infant's head and the mischief has gone beyond all chance of real, permanent cure.

The tumor retains the shape of a normal testicle, and is therefore often mistaken for orchitis. It is only when the tunica albuginea has perforated that bosses and nodular projections appear. In some of the cases, however, when seen early enough, a limited induration, the starting-point of the disease, may be detected. The tumor is usually quite firm at first; but later, and especially in the more rapidly growing tumors, it appears soft, elastic, and even fluctuating; and since a certain amount of hydrocele is not uncommon, we need not be surprised that they are frequently mistaken for a collection of fluid, and tapped. Another remarkable feature of these growths, and one liable to lead to a mistaken diagnosis, is that there is not infrequently an apparent quiescence and in some instances an actual diminution in size of the tumor. The latter condition is, of course, explained by absorption of the fluid effusion.

Ulceration and true fungus hæmatodes are rare, because the coverings of the testis may be enormously stretched, and even when the tunica albuginea has yielded the scrotum expands for awhile; but it may finally become adherent to the growth, and ulcerate; this, however, happened only once in the 114 cases collected by the writer, showing that castration is usually performed before the tissues have yielded to the pressure.

With the growth of the tumor the spermatic vessels and scrotal veins enlarge; secondary deposits in or involvement of the cord are by no means frequent. Implication of the glands, however, such as those of the iliac and lumbar regions, is quite common in advanced cases, and may be detected by careful palpation along the brim of the pelvis and on either side of the vertebral column. Abdominal pain and tenderness, œdema of the lower extremities, a failing appetite, nausea, vomiting, jaundiced skin, cough, and bloody sputa point to secondary deposits in the abdominal organs or lungs, and death from exhaustion usually closes the scene.

Diagnosis. The diagnosis between the soft and rapid forms of sarcoma and carcinoma of the testis is almost impossible until the microscope decides the question; nor is it necessary to make a hair-splitting diagnosis, as the welfare of the patient demands ablation in every case of malignant testicular tumor.

The differential diagnosis between sarcoma and orchitis is by no means easy, for in both we may and often do have the history of an injury, and, as matter of fact, many of the sarcomas develop after an attack of orchitis. In the sarcomas, however, the growth is more slow, less painful, and the presence of the testicle cannot be so readily made out as in orchitis. When strapping and the use of mercurials and potassium iodide fail to effect a decided improvement, we may eliminate the diagnosis of traumatic or syphilitic orchitis, while the general appearance of the patient, and, above all, the absence of elasticity in the tumor, will aid us in recognizing a tubercular testicle. The presence of fluid in the tunica vaginalis and the indistinct fluctuation which accompanies the softening of the tumor may obscure the character of the tumor and lead to the diagnosis of hæmatocele or hydrocele. Kocher had such a case, and even Dupuytren removed an old hydrocele for malignant disease; and quite a large number of the cases reported here were tapped, showing that they were mistaken for a collection of fluid; indeed, in very many cases the diagnosis is not made until tapping has been resorted to. In all doubtful cases an exploratory incision should be made, followed at once by extirpation, especially if puncture of the tumor is followed by the flow of bright blood.

Prognosis. The prognosis of all varieties of sarcoma is grave, and especially in children and in rapidly growing tumors. In 41 fatal cases collected by me the variety of the tumor was not specified in 13. Of the remaining 28 cases 11, or 39.2 per cent., belonged to the round-celled or medullary group; 3, or 10.7 per cent., were alveolar sarcoma; 5, or 17.9 per cent., cystosarcoma; 3, or 10.7 per cent., mixed sarcoma; 3, or 10.7 per cent., small round-celled sarcoma; 1, or 3.5 per cent., spindle-celled, and 1 each lympho- and fibrosarcoma.

The 41 fatal cases terminated as follows:

Died.	*Cause of Death.*
1 within 32 hours.	Septic peritonitis, showing also metastatic sarcoma of lung. No. 9.
1 " 2 days.	Perforation of metastatic tumor of kidney. No. 28.
4 " 15 "	Exploratory operation, abdomen and pelvis. Cases V. and 104. Secondary internal tumors in Case 22. Cause not given in Case 57.
8 " 1 month.	Recurrence in internal organs in Cases Nos. 18, 20, 33, 68, 75, 89. Cause not given in Nos. 13 and 36.
4 " 2 months.	Alleged phthisis, No. 24. Recurrence internal organs, Nos. 14, 98, 105.
3 " 3 "	Cases I. and 52, abdominal tumors. Cause unknown, Case 26.
1 " 4 "	Sarcoma of omentum. No. 31.
1 " 5 "	Sarcoma of abdomen. No. 106.
3 " 7 "	Sarcoma of abdomen and inguinal region. Nos. 5, 99, 107.
3 " 8 "	Sarcoma of abdomen and inguinal region. Case VI. Nos. 23, 46.
1 " 9 "	Recurrence, seat not stated. No. 37.
1 " 10 "	Recurrence, abdominal. No. 66.
1 " 11 "	Recurrence, abdominal. No. 73.
2 " 12 "	Recurrence, lung, spleen. Nos. 34 and 100.
1 " 16 "	Recurrence, abdominal. No. 53.
1 " 18 "	Recurrence, lung. No. 21.
1 " 21 "	Recurrence, ... No. 35.
2 " 25 "	Secondary deposits. Nos. 4 and 82.
2 " 36 "	Secondary deposits, lungs, Case III. Rectum, bladder, etc., No. 45.

The general prognosis after excision of the diseased testicle may be judged from the following data:

Of the 114 operated cases one case, No. 29, has been reported twice, leaving 113 cases to be disposed of. Of these we have no history of the ultimate result in 37 cases beyond the fact that the patients survived the operation and were discharged apparently well; but nothing is known of their subsequent condition; 41 patients died within a period varying from a few days to three years after the operation; indeed, 23, or 56 per cent., of the fatal cases perished within five months from secondary tumors in different organs, suggesting, at least, the probability that the operation had been deferred too long; 11 patients, or 27 per cent., lived from seven to twelve months after the operation; 5 patients, or 12 per cent., survived the operation from sixteen to twenty-four months, and 2 patients, or 5 per cent., survived the operation three years, but perished from secondary growths. Of the 35 remaining cases in which the end results are known the patients were alive, and the time elapsed since date of operation and of report was as follows:

18	1 to 12 months.		2	6 yrs. 6 mos,	No. 1, 30
2	13 months,	No. 7, 97	1	6 " 9 "	" 32
1	21 "	" 38	1	8 " 10 "	" 27
1	24 "	" 101	1	9 "	" 103
1	25 "	" 72	1	10 "	Case II.
1	36 "	" 11	1	10 " 6 mos.	No. 25
2	4 years,	" 69. 71	1	15 "	" 84

In one instance, No. 43, there was a recurrence of the disease six years after the operation; but the patient is reported as doing well seven months after the second operation.

From a careful analysis of the clinical histories we may conclude that the results of operative interference have been very gratifying, and the only treatment that offers any hope is prompt and radical extirpation, and this should be done without any special regard as to the malignancy of the tumor, since Adler has reported a case to the Berlin Medical Society (see *Trans.*, vol. xxv. pp. 164-166) in a man, aged twenty-four years, upon whom he performed castration May 11, 1892, and the tumor proved to be a cystadenoma. The patient died in September, 1893, from metastasis in the lungs of the same character, and not a trace of carcinoma or sarcoma could be detected.

In conclusion, I desire to express my obligations to Dr. D. S. Lamb for facilities extended in the study of the specimens in the Army Medical Museum.

No.	Reporter, date, and reference.	Age	Course and duration.	Operation.	Result.
1	Kraske. Centralb. für Chirurgie, 1880. iii.	42	5 yrs.; following contusion right testicle; left testicle enlarged 15 mos. after rapidly; castration of left; 3 mos. later right testis increased, also extirpated.	Castrat'n.	Sarcoma. Discharged two weeks after operation. 6½ years after second operation patient remained well.
2	De Beauvais Bull. Soc. de Méd. de Paris, 1880–1881, xv. pp. 171–175.	50	No details, induration affected cord.	Castrat'n	Sarcoma. No return after 8 months.
3	E. Ehrendorfer. Arch. für klin. Chirurgie, 1881–82, xxvii. pp. 336–373.	47	5 years' duration; right testicle.	Castrat'n.	Alv. sarcoma, micro. ex. Sup'ration and abdom.abscess Discharged 8 weeks after operat'n; no reply to subseq. inquiry; believed to have died, as extraperitoneal tumors could be felt in abdominal cavity.
4	E. Ehrendorfer. Ibid.	36	15 years' duration, after injury of left testicle; tumor increased rapidly.	Castrat'n.	Alveolar sarcoma. Mic.ex. Discharged 3 weeks after operation. Died 2 years after operation from secondary deposit.
5	E. Ehrendorfer. Ibid.	24	5 years ago left testicle in ing. canal began to enlarge and descend; rapid growth during last 2 mos.	Castrat'n.	Alveolar sarcoma. Mic. ex. Discharged 2 weeks after operation. Died 7 weeks after operation from secondary deposit.
6	E. Ehrendorfer. Ibid.	42	Several years, gradual enlargement of right testis; no injury.	Castrat'n.	Round-celled alv. sarcoma. Discharged 14 days after operation. No end results.
7	E. Ehrendorfer. Ibid.	40	1 year; left testis began to enlarge; no injury.	Castrat'n.	Round-celled alv. sarcoma. Discharged 15 days after operation. Patient perfectly well 13 mos. later.
8	E. Ehrendorfer. Ibid.	44	8 months duration; right testis; no injury.	Castrat'n.	Small r'd-celled sarcoma. Discharged 14 days after operation; no subsequent hist., but patient at time of discharge suffered from headache, ptosis, facial paralysis, and had a number of cutan. tumors from a pea to size of pigeon egg.
9	E. Ehrendorfer. Ibid.	46	16 years ago noticed swelling of right testis compl. ing. hernia; swelling increased rapidly during last 6 months; no injury.	Castrat'n.	Sarcom. carcinoma. Death 32 hours after operation; septic peritonitis, metast. in lungs also.
10	E. Ehrendorfer. Ibid.	18	1 year swelling of right testis, increased rapidly; no injury.	Castrat'n.	Spindle-celled sarcoma. Discharged 3 weeks after operation. No end result.
11	E. E. Wendt. N. Y. Med. Journ., 1881, xxxiii. pp. 626–632.	61	3 months before operation noticed swelling of left cryptorchis; increased rapidly.	Castrat'n, Feb. 26, 1878	Round-celled sarcoma. Discharged May 27, 1878; 3 years later no recurrence of the malignant disease.
12	H. F. Formad. Trans. Path. Soc., Phila., 1879–1881, 1882, p. 144.	17	1 year.	Castrat'n, Oct. 1880	Large spindle-celled sarcoma. No end result.
13	J. H. Brinton. Ibid., p. 145.	40	3 years; no injury.	Castrat'n, May 4, 1880	Large spindle-celled sarcoma. Patient died June 1, 1880.
14	J. H. Brinton. Ibid.	...	Recalled a case operated for sarcoma of the testis 3 or 4 years before.	Castrat'n.	Sarcoma. Wound healed readily, but in 9 or 10 wks. the retro-periton'l glands became involved, later those of the neck, and death occurred.
15	F. S. Gould. Trans. N. Y. Path. Soc., 1881, 1882, i. pp. 46–48.	24	7 months; injury of left testicle.	Castrat'n, Nov. 1, 1880	Micr. exam. revealed enchondromatous sarcomatous, adenomatous, and cancerous structure. Patient still well Jan. 20, 1881.
16	Mr. Bellamy. London Lancet, 1882, vol. i. p. 392.	33	18 mos. before admission patient observed the left testis to enlarge; no injury; good family history.	Castrat'n, Dec. 15, 1881	Round-celled sarcoma. Disease involved cord; Jan. 5, 1882, patient doing well, but a small lump, size of almond, can be felt beneath skin of scrotum.

No.	Reporter, date, and reference.	Age	Course and duration.	Operation.	Result.
17	G.E. de Schweinitz. Trans Path. Soc., Philada., May 23, 1884, vol. xii. p. 225.	37	2½ yrs. before patient first observed enlargement of left testis, which has grown rapidly last 8 mos., 14½″ in circumfer. time of operation; no syphilis. sister probably had a sarcoma of the orbit.	Castrat'n, May, 1884, by Dr. Ashhurst.	Round-celled sarcoma. No end-result.
18	G.E. de Schweinitz. Ibid., p. 226.	43	1 year before patient first noticed a globular swelling of left testicle; a short time previous to this had suffered with gonorrhœa, which was followed by an attack of orchitis; on May 22, 1884, examination revealed a very large tumor of the testicle, ing. glands of left side involved, and above the line of Poupart's ligament another mass in the left illac fossa; patient begged for an operation.	Castrat'n, May 22, 1884	Round and spindle-celled sarcoma. Patient progressed very well a few days, when he died rather suddenly. Necroscopy showed commencing phthisis of apex of lungs, a pint of serum in left plural cavity: liver very fatty, heart normal; retroperiton. glands converted into a huge sarcomatous mass, also glands and tissues of the left iliac region.
19	G.E. de Schweinitz. Ibid., p. 223.	26	18 months before patient struck his left testicle, in mounting his horse, on the pommel of the saddle. In May, 1883, first observ'd enlargement, which, with pain and other symptoms, induced him to apply in Oct. 1883, for relief.	Castrat'n, Nov. 1883, by Dr. Brinton.	"Round and spindle-celled sarcoma." No end-result.
20	G.E. de Schweinitz. Ibid., 1885–1887, vol. xiii. p. 157.	...	In Dec. 1883, patient contracted syphilis. In Aug. 1885, first observed painless induration of testicle which rapidly increased with involvement of ing. glands.	Castrat'n, Nov. 1886	"Medullary sarcoma." Patient died 1 mo. after operation from secondary deposits in abdominal cavity.
21	H. Keil. Casuistische Beiträge zur ablatio testis, 8vo. Halle a S. 1886. Thesis.	29	2½ years ago noticed enlargement of right testis, increased rapidly during the last few months.	Castrat'n, Sept. 12, 1873	"Mixed sarcoma," Patient discharged Oct. 12, 1873, but died April 27, 1875, from metastasis in lungs.
22	H. Keil. Ibid.	19¼	Patient could only say that the left testis had enlarged very rapidly during a few months.	Castrat'n, May 4, 1875	Round-celled sarcoma. Pneumonia developed 3 days after operat'n; death May 11, 1875; numerous metastasis of internal organs.
23	H. Keil. Ibid.	27	15 months ago first noticed swelling of left testis, following a bruise; rapid increase during last few months.	Castrat'n, May 11, 1875	Cystic sarcoma. Patient discharged May 29, 1875, but died Jan. 1876, from internal tumors.
24	H. Keil. Ibid.	26	4 months before admission contusion of right testis; tumor developed since that time.	Castrat'n, Nov. 10, 1874	Medull. sarcoma. Patient died January 3, 1875, from alleged phthisis; no necropsy.
25	H. Keil. Ibid.	33	3 years before admission patient sustained contusion of the right testicle, since which time gradual growth of tumor.	Castrat'n, June 14, 1875	Sarcoma. Patient discharged June 26, 1875; letter received in Dec. 1885, reports himself still well.
26	H. Keil. Ibid.	32	6 months before admission left testicle began to enlarge; no injury or venereal disease.	Castrat'n, Mar. 14, 1876	Sarcoma with numerous cheesy deposits. Patient discharged March 30, 1876, but died several mos. later.
27	H Keil. Ibid.	41	3 years before, contusion of right testis, pommel of saddle; gradual growth and painful during last year.	Castrat'n, Jan. 30, 1877	Medull. sarcoma. Patient discharged Feb. 15, 1877, and is still well in December, 1885.
28	H. Keil. Ibid.	58	2½ years before admission severe contusion of left testicle; gradual growth, but more rapid and painful of late, with rapid emaciation.	Castrat'n, July 9, 1876	Sarcoma. Patient died two days after operation from perforation of a secondary kidney tumor.

No.	Reporter, date, and reference.	Age	Course and duration.	Operation.	Result.
29	H. Keil. Ibid.	42	6 years before admission, severe contusion of right testicle, which left some enlargement, which a year later had noticeably increased.	Castrat'n, Nov. 13, 1878	Round-celled sarcoma. Patient discharged 14 days after operation.
30	H. Keil. Ibid	42	The same patient was re-admitted in July, 1879, stating that during the last 5 months a tumor of the left testis developed, which now was the size of a fist.	Castrat'n, July 17, 1879	Round-celled sarcoma. Patient discharged Aug. 15, 1879, and in Jan. 1886, remained still well.
31	H. Keil. Ibid.	28	8 months before admission patient noticed that a retained right testicle was beginning to enlarge.	Castrat'n, Jan. 2, 1879	Sarcoma. Patient discharged Jan. 24, 1879, but returned May 5, 1879, with abdominal tumor, from which he died.
32	H. Keil. Ibid.	35	9 months ago noticed enlargem't of right testicle; no apparent cause.	Castrat'n, Mar. 6, 1879	Medull. sarcoma. Patient discharged Mar. 28, 1879, and in Dec. 1885, still well.
33	H. Keil. Ibid.	23	1½ years ago noticed enlargement of left testis; no apparent cause; very large and rapid growth.	Castrat'n, Jan. 13, 1880	Cystic sarcoma. Wound healed nicely, but patient died Feb. 1, from abdom. tumor and pulm. œdema.
34	H. Keil. Ibid.	45	2 years duration of tumor; no injury.	Castrat'n, Aug. 16, 1880	Sarcoma. Patient discharged Aug. 21, 1880; died in 1881 from metastatic tumors of the lungs.
35	H. Keil. Ibid.	33	Several years ago noticed enlargement of a retained right testicle, which has grown very rapidly and painful during past 6 mos.	Castrat'n, Aug. 3, 1881	Sarcoma. Patient discharged Aug. 30, 1881, but died 21 months later from metastasis.
36	H. Keil. Ibid.	53	5 years before admission patient observed gradual and painless growth of the right testicle; no apparent cause.	Castrat'n, Apr. 26, 1882	Small-celled sarcoma. Patient discharg'd May 13, 1882, but died soon afterwards; cause not known.
37	H. Keil. Ibid.	29	During last 4 mos. patient felt a swelling of the retained left testicle in ing. canal, which is now the size of a fist and very painful.	Castrat'n, Jan. 28, 1884	Mixed sarcoma. Patient discharged Feb. 9, 1884, died 9 months later from metastasis.
38	H. Keil. Ibid.	29	1½ years ago noticed enlargement of his retained left testicle.	Castrat'n, Oct. 18, 1884	Round-celled sarcoma. Patient discharged 2 wks. after operation, and in July, 1886, was still free from disease.
39	H. Keil. Ibid.	44	6 months before admission sustained contusion of left testicle from the pommel of a saddle; swelling and pain subsided, but during the last 3 months tumor rapidly developed.	Castrat'n, Dec. 14, 1884	Sarcoma. Patient discharged 14 days after operation, and remains well in Dec. 1885.
40	H. Keil. Ibid.	27	6 months before admission patient observed painful enlargem't of right testis; no apparent cause.	Castrat'n, Mar. 20, 1885	Small-celled sarcoma. Patient discharged Apr. 3, 1885, and remains well to January, 1886.
41	H. Keil. Ibid.	36	6 months ago observed enlargem't of retained right testicle, with rapid and painful growth, complicated with hernia	Herniotomy and castrat'n, May 15, 1885	Round-celled sarcoma. Patient discharged 3 wks. after operation, and was still well in Dec. 1855.
42	C. H. Wilkinson. Texas Med. and Surg. Rec., Galveston, 1882, ii. pp. 14–24.	71	23 years before, *i.e.*, during the Indian mutiny in '57, while in the Eng. navy, received shell wound of left scrotum, after which gradual enlargement of testicle.	Castrat'n, Apr. 17, 1880	Sarcoma. Wound healed, patient discharged, but readmitt'd July 23, 1880, with tumor in left side near ing. region; patient died a few weeks later from sarcoma of the omentum.
43	L. C. Toney. St. Louis Med. and Surg. Journ., 1884, xlvii. p. 126; 1890, lix. pp. 81–84.	70	6 weeks before admission patient noticed a tumor of right testicle; no injury; pain, no syphilis; tumor size of goose egg.	Castrat'n, Apr. 1884	Rd. spindle-shaped celled cystic sarcoma. In Feb. 1890, the patient returned with a recurrence of the same disease, and another excision was performed; Aug. 1890, patient still well.

No.	Reporter, date, and reference.	Age	Course and duration.	Operation.	Result.
44	J. Schubert. Ein Tall von Hodensurcom bei einem 5 jährigen Knaben, 8vo. Greifswald, 1885.	5	6 months before admission little patient suffer'd from orchitis right side; Dec. 1884, patient fell and complained of pain in scrotum, which was the size of an apple.	Castrat'n, Jan. 27, 1885	Sarcoma. Boy discharged as cured Feb. 21, 1885. No end-result.
45	J. Schubert. Ibid.	2	6 months before admission at the Dresden Clinic in 1883, tumor observed in left testicle.	Castrat'n, Aug. 3, 1823	Medull. sarcoma. Patient discharged Sept. 1823, readmitted Jan. 1824, oper. Feb. 8, 1824; continued well until May, 1824, when tumor was discovered in right testicle; extirpation May 6, 1824; local recurrence after a few days; died July 1, 1827. Necroscopy: Sarcom. growth in left ing. region involving part of rectum, bladder, mesentery, etc.
46	Sidney Jones. The Lond. Lancet, 1885, vol i. pp. 425–427.	21	9 months before admission patient first observed a small hard lump in right testicle. which slowly increased; 4½ months ago patient injured this testicle, followed by rapid swelling, tumor 11¾ in. in circumference.	Castrat'n, Jan. 30, 1884	Small round-cell'd sarcoma. Patient discharged Feb. 1884, readmitted Oct. 7tb, and died Oct. 29, 1884. Necroscopy revealed metastatic tumor of the same character within inguinal canal and abdom. cavity.
47	Sidney Jones. Ibid.	51	5–6 years before admission patient received a blow on his right testicle, swelling since, steadily increased 18 months ago; circumference 10 inches.	Castrat'n, April 9, 1884	Small round-cell'd sarcoma Patient discharged Apr. 28, 1884. wound healed. No end-result.
48	Sidney Jones. Ibid.	36	9 mos. before left testicle began to enlarge without injury and syphilis.	Castrat'n, Sept. 24, 1884	Sarcoma. Patient discharged Oct. 8, 1884. No end-result.
49	R. W. Parker. Trans. Path. Soc., London, April 7, 1885, vol. xxxvi. p. 299.	3 mo.	The testicle at the time of birth was the size of a walnut, until, at the time of extirpation, it was the size of a hen's egg.	Castrat'n.	Congenital adenosarcoma. No end-result.
50	Mr. Owen and Silcock A. Quary. Ibid., Apr. 7, 1885, p. 301.	8 mo.	Left testicle enlarged at time of birth, gradually increased in size to date of admission in July, '84, when it was 3 or 4 times larger than the right, which was normal.	Castrat'n. July, 1884	Congenital sarcoma. Little patient lost sight of. No end-result.
51	Mr. Owen and W. C. Chaffey. Ibid., Apr. 7, 1885, p. 302.	11 mo.	Mother 5 days before admission noticed enlargement of testicle.	Castrat'n, Dec., 1884	Round-celled sarcoma. No end-result.
52	F. Schuckmann. Das Sarkom des Hodens 8vo. Würzburg, 1885, Thesis.	40	6 months before patient noticed enlargement of right testicle, which rapidly increased; no injury.	Castrat'n, June 14, 1884	Round- and spindle-celled sarcoma. Patient discharged July 23, 1884. No end-result.
53	J. Murphy, Rep. Prov. Northumb and Durham Med. Soc , Newcastle-on-Tyne, 1885–86, p. 151; 1886-1887, pp. 165–169.	22	1 year before admission patient observed enlarge- of left testicle; not painful, gradual growth at first, more rapid afterward; tumor when excised weighed 1 lb. 1 oz.	Castrat'n, Feb. 16, 1885	Cystic sarcoma. Wound practically well in March, 1886, but about the middle of April, patient revealed an abdom. tum. reaching almost to the umbilicus. Died June 9, 1886 ; a large sarcoma occupied almost the whole abdomen..
54	J. Murphy. Ibid.	74	4 months before consulting Dr. Murphy, patient observed swelling of right testicle without apparent cause, which in a few weeks was followed by enlargement of the left testis; both continued to increase in size until the right was as large as a coccoa-nut, and left similar, but smaller.	Castrat'n, Dec. 10, 1886	Small round- and spindle-celled sarcoma. Patient returned to his home a fortnight after operation, and up to Sept. 1887, continues well, but Dr. M. fears a return.

No.	Reporter, date, and reference.	Age	Course and duration.	Operation.	Result.
55	D. Maclean. Physician & Surgeon, Ann Arbor, Mich , 1886, viii. p. 162.	41	15 mos. before admission patient fell astride a fence and bruised his right testicle; under treatment he appeared to recover fully, but within the past few months the swelling returned, with formation of an abscess which discharged without surgical interference, but left a tumor size of a man's fist.	Castrat'n, Oct. 8, 1885	Sarcoma. Patient discharged Nov. 7, 1885. No end-result.
56	E. Seyler. Zur Casuistic der Hodensarcoma 8vo. Greifsw..'87. Thes.	50	A few weeks before admission patient noticed enlargement of left testicle; no pain, no injury.	Castrat'n, April 7, 1887	Round celled sarcoma. Wound healed kindly. No end-result.
57	G. McClellan. Trans. Path. Soc., Philada., May 26, 1887, xiii. p. 159.	65	Growth removed by Dr W. L. Atlee, involving epididymis and cord; no details	?	Sarcoma. Death occurred within a week after operation.
58	G. McClellan. Ibid.	27	Growth appeared to have followed a blow upon the testicle.	?	Sarcoma involving the entire testicle. No end-result.
59	Von Kahlden. Münch. med. Wochenschrifft, 1887, No. 31.	44	During past year dragging pain in the abdomen located near the umbilicus; tumor of left testicle in abdom'n diagnosed; right testis could not be found, but cord terminated in a large tumor.	Castrat'n.	Large celled myxosarcoma weighing 5960 grammes. No end-result.
60	T. S. Westcott. Trans. Path. Soc., Phila., 1887–1889, 1891, xiv. p. 206.	54	One year before kicked in the privates, but soon forgot injury; 5 months ago noticed tumor of left testis, and 2 weeks ago the right gland began to enlarge.	Castrat'n.	Alveolar sarcoma. No end-result.
61	A. Eder. Aertzl. Ber. der Privat Heilanstalt. d. Dr. A. Eder, 1887. Wien, 1888, pp. 81–83.	37	During his remembrance knew of a swelling in left ing. canal size of pigeon egg, which was movable until, about 2 mos. ago, it began to swell rapidly until Aug. 27, '87, the tumor in left ing. canal had attained the size of a fist.	Castrat'n.	Sarcoma. Patient discharged Sept. 17, 1887. No end-result.
62	F. M. H. Seemann. Ueber Castration bei retinirten Hoden 8vo Berlin, 1888, Thesis.	50	Retained left testicle in inguinal canal complicated with hernia. Virchow & Hirsch, Jahrg. 1881, ii. p. 234.	Castrat'n.	Medull. sarcoma. Tumor weighed 985 gr. No end-result.
63	F. M. H. Seemann. Ibid.	38	Retained right testicle during past 6 months enlarged until size of fist.	Castrat'n.	Sarcoma. No end-result.
64	H. Hugger. Pathol. anatom. Beitrag zur Kenntniss der Hoden-Sarcoma, 8vo Wurzburg, 1888. Thesis.	33	2½ years before admission sustained a severe contutusion of right testis, followed by inflam. swelling which was relieved, but a few weeks later swelling recurred without pain; since the early part of January 1886, increase in growth more rapid.	Castrat'n, Mar. 15, 1888	Alveolar round-celled sarcoma. Patient discharged April 10, 1888; no recurrence to August, 1888.
65	H. R. Wharton. Trans. Path. Soc., Philada., Feb. 28, 1889, vol. xiv. p. 208.	...	4 years before patient first observed swelling of right testicle; no pain; tapped twice and again on Oct. 1888; since last tapping tum. has become painful and increased rapidly.	Castrat'n, Feb. 10, 1889	Spindle-celled sarcoma. No end-result.
66	Paul K. G. Stenger. Ueber Hoden. Tumoren im anschluss an die im Königl klin. zu Berlin vom Apr. 1, 1883. bis Apr. 1, 1889, oper. Fälle, 8vo Berl. '89, Thes.	3	Tumor of left testicle one year's duration; inguinal glands involved.	Castrat'n, April 4, 1884	Sarcoma. Patient died Feb. 7, 1885, from metastatic abdominal tumors.

No.	Reporter, date, and reference.	Age	Course and duration.	Operation.	Result.
67	Paul K. G. Stenger. Ibid.	42	6 months before admission observed swelling of right testis; now size of a man's fist.	Castrat'n, May 21, 1884	Sarcoma. Patient discharged May 31, 1884. No end-result.
68	Paul K. G. Stenger. Ibid.	30	1 year before patient noticed swelling of left testis, gradually increasing, extending to ing. canal.	Castrat'n, Mar. 26, 1885	Sarcoma. Patient discharged April 6, 1885, but died the same month from metast. abdom. tumor.
69	Paul K. G. Stenger. Ibid.	63	Tumor of left testicle of 7 weeks' duration, now as large as a goose egg.	Castrat'n. Jan. 12, 1885	Sarcoma. Patient disch'd Jan. 21, 1885; no return up to 1889.
70	Paul K. G. Stenger. Ibid.	42	Tumor of right testicle one year's duration, now size of a child's head.	Castrat'n, Mar. 10, 1885	Sarcoma. No end-result.
71	Paul K. G. Stenger. Ibid.	41	Tumor of right testicle of 7 months' duration.	Castrat'n, June 20, 1885	Sarcoma. Patient disch'd July 1, 1885; no return up to 1889.
72	Paul K. G. Stenger. Ibid.	39	Tumor of right testicle ¾ years' duration, now size of hazelnut	Castrat'n, Dec. 6, 1886	Sarcoma. Patient disch'd Dec. 1886; no return up to 1889.
73	Paul K. G. Stenger. Ibid.	40	Tumor of right retained testicle, one year's duration, now size of fist.	Castrat'n, Oct. 8, 1887	Sarcoma. Patient disch'd Nov. 22, 1887, but died Oct. 1888, from abd. récidiva.
74	Paul K. G. Stenger. Ibid.	46	Tumor of left testis of 4 months' duration, pyriform, extending to the inguinal canal.	Castrat'n, Jan. 10, 1888	Sarcoma. Patient disch'd, and up to 1889 no relapse.
75	Paul K. G. Stenger. Ibid.	2	Tumor of right testicle, began 1½ years ago, after delayed descent of testis; tumor now size of goose egg.	Castrat'n, Aug. 31, 1888	Sarcoma. Patient disch'd, wound healed, Sept. 1888; died 3 weeks later from récidiva in abdomen.
76	Paul K. G. Stenger. Ibid.	62	Tumor of left testicle two years' duration; now size of fist and extending to inguinal canal.	Castrat'n, Oct. 2, 1888	Sarcoma. patient disch'd Oct. 15, 1888, and no relapse up to 1889.
77	W. Rose. Med. Press and Circular, Lond., 1889. No. 5, xlvii, p. 287.	24	Over a year ago right testis contused, causing intense pain, since when tumor rapidly developed.	Castrat'n, April, 1888	Sarcoma. Patient disch'd, but disease recurred 10 months later in the right groin, and was excised. No end-result.
78	Beatson. Glasgow Med. Journ., 1890, xxxiii p. 383.	40	11 mos. before admission patient observed a swelling in his right groin, testicle undescended; rapid growth of tumor, which increased to 15″ in circumference.	Castrat'n, Nov. 16, 1889	Sarcoma. No end-result.
79	J. B. Deaver. Trans. Path. Soc., Philada., June 12, 1890, vol. xv. p. 235.	10	Scrotum has always been abnormally large and has been treated without effect; 10 days before sustained kick upon left testicle, since which time rapid increase in size.	Castrat'n, June, 1890	Sarcoma of telangiectatic type. The boy left hospital apparently well. No end-result.
80	Roddick. Montreal Med Journ., 1890–91, xix. p. 842.	40	Patient first observ'd swelling of testicle 2 years ago, for which scrotum was tapped 9 times; no injury or syphilis.	Castrat'n. Feb., 1891	Large round-celled sarcoma. No end-result.
81	A. H. W. Herfarth. Die Geschwültze d. Scheidenhäute des Hodens, etc., 8vo. Marburg, 1891, Thesis.	74	20 years before admission patient observed swelling of right testicle, which in July, 1890, had attained the size of a child's head.	Castrat'n, July, 1890	Myxochondrofibro-sarcoma. No end-result.
82	C. Heath. Lancet, London, 1891, i. pp. 71–73.	...	In a clin. lect. referred to, an officer from India from whom he removed a few years ago a testicle which was distinctly cystic and also sarcomatous.	....	He got perfectly well, and returned to India, but died within 2 yrs. with growth in neck and chest, and with the ordinary history of sarcoma developing in other parts of the body.
83	Rydygier. Archiv für klin Chirurg., xvii. p. 769.	42	Tumor in right testicle.	Castrat'n.	Melanosarcoma. 4 weeks after operat'n the patient, who is a physician, complained of pain in left testicle, which was also excised; 40 days after no relapse.

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84	Fischer. Zeitschft. f. Wundärzte u. Geburtshilf. Fellbach, 1891, xlii. pp. 27–29.	48	Several years ago patient observed enlargement of of right testicle, occasionally lancinating pains.	Castrat'n, Mar. 23, 1873	Cystic sarcoma. 15 years after operat'n no récidiva.
85	J. Hofmokl. Bericht d. k. k. Krankenanstalt Rudolph Stiftung in Wien, 1891–92, p. 384.	51	As a boy suffered from traumatic orchitis, and 15 yrs. ago observed swelling and induration of left testis, which gradually increased, and painful after taking cold.	Castrat'n, May 4, 1891	Large celled cystosarcoma. Patient discharg'd May 26, and up to June 30, 1891, no return.
86	T. Fiaschi. Australas. Med. Gazette, Sidney, 1891–92, xi. p. 435.	44	Born a cryptorchid, and left testicle could always be felt in lower part of abdominal walls a little above Poupart's ligament; 12 mos. ago, while erecting a bridge and working 26 days in water, testicle began to swell and cause pain.	Castrat'n, Sept. 17, 1892	Round-celled sarcoma. Patient left Sydney 17 days after operation.
87	A. Keller. Das Cystosarcoma testis, 8vo Würzburg, 1892, Thesis.	30	Tumor attained very rapidly size of two fists, but quite painless.	Castrat'n.	Cystosarcoma. No end-result.
88	Farewick. Ueber Tumorenbildung bei Leisten und Bauchhoden, 8vo Bonn, 1893. Thesis.	30	Patient a month before first felt pain in abdomen; tumor of right retained testicle suspected.	Laparotomy, Oct. 31, 1892, tumor removed.	Mixed sarcoma. Patient discharged Dec. 9, 1892; in Jan. 1893, some induration in right ing. region, but not regarded as due to a recurrence.
89	Farewick. Ibid.	38	Also reports Maydl's case, Allg. Wien. Med. Zeitung, 1885, No. 47, of a tumor of retained right testicle in inguinal canal which developed rapidly.	Remov'd.	Medul. sarcoma. Several weeks after removal there was recurrence of the disease; another operation; died within a few days.
90	M. Jahrmärker. Zur Casuistik der Hodentumoren, 8vo Halle, a S., 1894, Thesis.	68	4 yrs. ago patient observed swelling of testicle without apparent cause; painful tumor tapped, better for 3 months, after which swelling increased more rapidly; treated a number of times by tapping.	Castrat'n, July 12, 1893	Round-celled sarcoma. Patient discharged Aug. 1, 1893, and no return of disease up to March 6, 1894.
91	H. H. Williams. Indian Med. Rec., Calcutta, 1894, vi. p. 371.	50	Admitted a Hindoo to Gen. Hosp., Lucknow, Dec. 17, 1893, for fibro-cystic dis. of left testicle of 26 years' standing and reaching to nearly his knees; free incision liberated 6 pints of purulent fluid, and testicle in sarcomatous state.	Castrat'n, Dec. 18, 1893	Suppurative sarcoma. Patient discharged Jan. 27, 1894, greatly improved in health and weight.
92	J. A. Fink. Ibid., p. 111.	45	Growth of right testicle noticed since childhood, and steadily increasing until size of a fœtal head.	Castrat'n, Oct. 12, 1893	Sarcoma. Patient disch'd Nov. 17, 1893, and in May, 1894, was still free from recurrence.
93	E. W. Walker. Cincin. Lancet Clinic, 1894, No. 5, xxxii. p. 173.	20	8 mos. before while scuffling patient was kicked in testicle, since which it has gradually enlar'd and grown painful; confined to bed for 9 weeks; tumor removed and found complicated with omental protrusion.	Castrat'n, January, 1894	Spindle-celled sarcoma. No end-result.
94	E. W. Walker. Ibid.	...	Tumor developed in undescended testicle, which had been subjected to pressure of a truss.	Laparatomy.	Spindle-celled sarcoma. Tumor removed from abdominal cavity; perfect recovery.
95	E. W. Walker. Ibid.	...	Tumor developed in testicle after being struck with a base-ball.	Castrat'n.	Sarcoma. No end-result.
96	C. A. Morton. Brit. Med. Journ., London, 1894, vol. ii. p. 980.	38	3 months before admission observed swelling of right testis, without injury, which has since increas'd rapidly.	Castrat'n, July 12, 1894	Round-celled sarcoma. No end-result.

No.	Reporter, date, and reference.	Age	Course and duration.	Operation.	Result.
97	M. Lawrie. Ibid., 1895, vol. i. p. 15.	29	6–8 months before admiss. patient noticed swelling in right testicle, which latterly has increased rapidly, with dragging pain in groin and hip.	Castrat'n, Oct. 21, 1893	Round-celled sarcoma. Patient alive and well Nov. 11, 1894.
98	F. Scheel. Ein Fall von Hodensarcom bei einen 2 jährigen Knoben 8vo Berlin, 1895. Thesis.	2⅓	2 mos. before a swelling of right testicle was observ'd which the attending physician treated as hydrocele; a month later tu mor was the size of a man's fist.	Castrat'n, May 30, 1895	Fibrosarcoma. Wound healed by first intention; July 8, 1895, patient suffered from involuntary evacuation of bowels and bladder, which led to examination of abdom., and discovery of a tumor in the right iliac region the size of an apple; 3 weeks later, at time of report, tumor was size of a man's fist.
99	F. Scheel. Ibid.	6	1 month before patient contused his left testicle, followed by rapid swelling.	Castrat'n, Oct. 12, 1878	Spindle-celled sarcoma. Patient discharged Oct. 28, 1878, but readmitted Mar. 12, 1879, for tumor in left hypogastric region; patient died May 19; abdominal sarcoma weighed 3600 grammes.
100	E. Lamphear. Amer. Journal Surg. and Gynec., Kansas City, 1895–1896, vii. p. 3.	46	Several yrs. before patient noticed enlargement of right testicle with dragging in cord; no venereal disease or injury, but in the autumn of 1890 patient fell and bruised this testicle, since which time it has grown rapidly.	Castrat'n, Sept. 19, 1892	Cystic sarcoma. No further trouble in the scrotum, but a year or more afterward, the man received a blow in the left side over the spleen, and sometime later a splenic tumor develop'd, and I was written to from California, to which State he had removed. I advised immediate splenectomy, which was rejected, and the patient died.
101	C. Lauenstein. Deutsche Zeitsch. für Chir. Leipzig, 1896, xliii.	38	At the end of the year in 1893, patient sustained a bruise of the left testicle, which resulted in a gradual swelling, which has increased within the last few weeks quite rapidly, and is now the size of a chicken egg.	July 27, 1894	Sarcoma. High operation; patient alive and doing well at the time of report.
102	C. Lauenstein. Ibid.	31	Patient sustained an injury of the testicle 9 mos. before, which resulted in a tumor the size of a goose egg at the time of oper'n.	Sept. 2, 1895	Sarcoma. High operation; patient well at the time of report.
103	J. B. Pike. Lond. Lancet, 1897, vol. ii. p. 1530.	...	Patient admitted Apr. 8, '97, for abdom. tumor, which, upon operation April 28, proved a typical round-celled sarcoma of right undescended testicle, weighing 3 lbs. 6 oz.	April 28, 1897	Round-celled sarcoma. At the time of report, Dec. 11, 1897, patient was in good health.
104	O. E. Balloch. Trans. Med. Soc. Dist. Columbia, Dec. 9, 1896.	20	In July, 1896, noticed a lump in the lower part of the abdomen, pain running from the right loin toward the bladder; gradual increase in growth; up to the age of 8 years both testicles were in the scrotum; at that time the left testicle receded, and has not been down since.	Operat'n, Sept. 4, 1896	Abdom. opened for exploration: Peritoneum thickened and traversed by distended veins; tum. densely adherent to bladder, rect'm and pelvic walls; part of tum. broken down. Case was not deemed one for operat'n, and the abdom. was accordingly closed. Patient died Sept. 19, 1896. Micro. exam. showed tum. to be a round-celled sarcoma; no evidence of testicle structure in the mass.
105	Adler. Verh. der Berliner med. Gesellschaft, 1894–1895, xxv. pp. 164–166.	19	Admitted into hosp. Jan. 1893; 3 weeks before patient noticed a swelling of left testicle, no pain; tumor size of a closed fist.	January, 1893	14 days after operation, enlargement of retro-peritoneal glands which grew rapidly. Patient died 8 weeks after the operation. "Spindle-celled sarcoma."

No.	Reporter, date, and reference.	Age	Course and duration.	Operation.	Result.
106	Wm. B. Coley 20th Century Practice of Medicine. vol. xviii. p. 588.	22	Family history good; previously in perfect health; received injury to left testicle from bicycle fall, July 1, 1896; within 1 w'k he noticed an increase in size, but growth was not painful; in Aug. 1896, tumor had reached the size of a fist.	May, 1897	Recur'nce followed in May, second operation in June, 1897; there quickly followed abdom. recurrence; the patient lost flesh and strength very rapidly, and died early in Oct. 1897. "Round-celled sarcoma." Autopsy showed narly all the abdominal organs extensively involved.
107	Wm. B. Coley. Ibid.	29	Patient injured left testicle during a bicycle fall in Aug. 1896; a swelling appeared in the injured part in September, and increased rapidly in size.	June, 1897	First operation by Dr. Millbank, of Albany. Speedy recurrence in the cord and inguinal glands; 4 operations were performed, 2 by Dr. Coley. Erysipelas toxins were tried for 3 or 4 weeks without effect; the tumors recurred, and the patient died in Jan. 1898. "Round-celled sarcoma."
108	Wm. B. Coley. Ibid.	27	Family hist. good; kicked by a horse 2 years before; a small lump appeared in the testicle, and although it never disappeared, it did not increase in size until 4 mos. ago, when the patient fell through a hayrack again injuring the same testicle; immediately afterward the old swelling began to increase in size and continued to do so rapidly until Aug. 8, 1898, when it had attain'd the size of a cocoanut; general health perfect; a diagnosis of sarcoma was made, and immediate castration advised.	Aug. 8, 1898	Wound healed by primary union. No end-result.

Case I.—S. M. R., aged forty-two years, dairyman. At the age of eight years had a swelling of the right testicle, the size of a chicken's egg, without apparent cause; swelling disappeared after a week's treatment, and the patient had no further trouble until November, 1885, when he sustained a severe saddle-bruise of the same testicle, followed by faintness and nausea, but not by any marked inflammatory reaction.

In the early part of December, 1885, the patient noticed a small induration in the injured testicle, about the size of a pea, which gradually enlarged until, when seen by me in June, 1886, it had attained the size of a goose-egg, and was quite painful.

Believing the tumor to be due to chronic inflammation, I advised a suspensory bandage and the application of belladonna and compound iodine ointment to relieve pain and promote absorption.

As the patient lived fifty miles away from my office, I did not see him again until March, 1887, when he reported that the tumor had slightly diminished, but was now again increasing in size. Suspecting for the first time the real nature of the tumor, I urged its removal; but he declined, until failing health, a poor appetite, backache, and dragging pain in the groin and loin induced him to consent to an operation, which was done March 1, 1888, with the assistance of Dr. H. I. Raymond, U. S. A. The scrotum contained considerable fluid. Cord and vessels were tied *en masse*, high up, with coarse silk ligature, and the testicle removed. There was no evidence of involvement of the spermatic cord. Antiseptic dressings, primary union, except in the lower end of the wound, where the drainage-tube had been left. Ligature came away on the fourteenth day after operation. Wound healed without a local return of the disease, but a few weeks later a secondary retroperitoneal growth appeared, from which he died June 27, 1888.

The tumor was forwarded to the Army Medical Museum, and upon arrival measured 5x3x3 inches. Microscopical examination by Dr. W. M. Gray showed it to be an "alveolar sarcoma." (Specimen A. M. M., No. 9864.)

Case II.—R. H. M., aged thirty-two years. When nine years old received a contusion of the right testicle, followed by a swelling. After recovery a small, indurated nodule remained. In 1883 this nodule had attained the size of a chicken's egg. While riding a "bucking horse" the tumor became contused. It gradually enlarged, at first slowly, afterward more rapidly, but without much pain. On June 21, 1888, the tumor had attained the size of the head of a newborn child, and was removed by Dr. H. I. Raymond, U. S. A., with my assistance.

Antiseptic precautions, spermatic cord tied, tumor enucleated, catgut suture and ligature applied, thorough drainage. Temperature normal on third day; dressings removed on eighth day; primary union.

Tumor, when fresh, weighed twenty-six ounces. Microscopical examination by Dr. W. M. Gray showed it to be a round-celled alveolar sarcoma. Patient doing well up to date. (Provisional pathological specimen A. M. M. No. 2301.)

Case III.—W. H. H., aged fifty-one years. No history of malignant disease in family. Hurt his testicle when a child, and again later while riding horseback. No trouble, however, until he hurt it again (probably in 1888), when it became inflamed and painful and confined him to bed. April 7, 1888, Dr. J. Ford Thompson removed it. Patient did well until April 12th, when wound was swollen and painful. Wound was opened and discharged pus, after which it healed.

The tumor was contributed to the Army Medical Museum by Mr. W. F. Works, medical student, and is numbered 2274, prov. path.

In August, 1890, the patient had symptoms of lung trouble, and in January, 1891, had profuse hemorrhage from bowels, severe pain in the right side of liver, slight cough, bloody and frothy sputa and occasionally mixed with fibrinous substance. No large hæmoptysis; was treated by some irregular physician till March 29th, when Dr. D. W. Prentiss saw him for the first time. He was much emaciated, pain in right side of chest, cough, bloody sputa. On auscultation and percussion found left lung normal; right lung solid except two small areas, one near apex, the other at base, anteriorly. Sputa examined by Dr. Theobold Smith; no bacilli. Bedsores beginning to appear on hips and sacrum. Potassium iodide and mercuric chloride for three weeks; subsequent treatment morphine, tonics, and stimulants.

Right side of chest became enlarged and intercostal spaces obliterated. Dr. Thompson aspirated and removed blood and what resembled partly organized fibrin. Dr. T. Smith examined this and reported it "sarcomatous." Patient died August 21, 1891.

Necropsy by Dr. R. T. Edes. Extreme emaciation. Right lung showed nodules of sarcoma and firm blood-clots throughout, except a small patch of normal tissue in upper lobe and a cavity in lower lobe containing about two ounces of pus. Lung firmly adherent almost everywhere. Right fourth to seventh ribs, inclusive, eroded posteriorly by pressure. Left lung normal except upper part of lower lobe, which was solidified and grayish. Heart flabby, normal. Intestines and liver normal. Spleen small, otherwise normal. Right kidney normal, left congested. Lymphatic glands of abdomen not enlarged.

Dr. W. M. Gray, of the Army Medical Museum, examined the testicle and lung and reported both as showing "lymphosarcoma." See also "Sarcoma of the Lung," by Dr. D. W. Prentiss, *Trans. Assoc. Amer. Physicians*, vol. viii. p. 191.

Case IV.—J. J. M., military convict, Irish, aged twenty-nine years, cachetic; had syphilis about 1882; no secondary or tertiary symptoms except, perhaps, chronic posterior nasal catarrh; left testicle said to be growing larger for a long time. On October 1, 1892, was admitted to Post Hospital, Alcatraz Island, Cal., with subacute orchitis; discharged October 31st. November 25th readmitted; testicle said to be growing rapidly, about four inches long and eight inches round; some pain on pressure, fluctuating spot near apex. Removed three drachms of yellowish fluid by exploring needle and applied strapping. November 30th removed two drachms of sanious-colored fluid and applied cold and strapping. December 7th testicle excised by Dr. Ogden Rafferty, U. S. A.; silk ligature and catgut sutures were used. Eight hours after operation a hemorrhage of two ounces occurred, which ceased spontaneously upon removal of bandages. Drainage-tube removed on the fourth day; three of the lower sutures absorbed. Discharged from hospital and the service December 22d; about one inch of the wound not quite healed. No subsequent history. The testicle weighed five ounces, and upon being cut open, discharged about one ounce of a thin, yellow fluid. In the centre was a hard nodule and a putrid, greenish fluid.

Microscopical examination by Dr. W. M. Gray shows the tumor to be a small round-celled sarcoma." (Specimen A. M. M., No. 2975.)

Case V.—J. Y., colored, aged twenty-two years. Testicle had been large and hard from boyhood. April 1, 1894, he noticed pain and a lump in right side of abdomen. Admitted to Freedmen's Hospital May 15th. Emaciation became progressive; pain not severe; the tumor showed as a conical eminence on right of middle line; edge of liver recognizable below; an ill-defined tumor in lower left abdominal quadrant. Tumor grew rapidly; no obstruction of bowels. May 29th Dr. Robert Reyburn opened the abdomen, and, finding the growth malignant, closed the wound. Patient died June 2, 1894.

Necropsy. Testicle converted into an oval, sarcomatous tumor 4 x 5 inches in diameter. Nodule in lower lobe of right lung. Heart weighed nine ounces, liver six pounds; contained sarcomatous nodules. Spleen atrophic, 2.25 ounces; right kidney 3.5 ounces, congested. Peritoneum and lumbar glands showed sarcomatous nodules. Specimen No. 10,733. A. M. M., was contributed by Dr. E. F. King, and microscopic examination shows it to be a "round-celled sarcoma."

Case VI.—A. W., private Eighteenth Ohio Volunteers; had mumps in 1861, at the age of twenty-one; claims that he took cold, which resulted in metastasis of both testicles, especially the right. In February, 1885, he stated to a board of medical examiners that the testicle had been getting hard and large for the last ten years, and that the left testis had diminished in size, and the board declared: "We find the right testis firmly retracted on external abdominal ring the size of a goose-egg; very hard, evidently partially ossified." A previous board, which examined the patient in June, 1883, makes no mention of a tumor, but states, "right testicle has not descended into scrotum, though outside of the external abdominal ring." His family physician states that he found the testicle enlarged in June, 1883, and upon examination in March, 1885, the tumor had enlarged considerably, and was removed in April, 1885. Dr. Gaston treated the man from August 4, 1885, to his death, November 17, 1885, and states that there was an abscess of the spermatic cord on the right side, and on the same side one of the inguinal glands was enlarged to the size of a goose-egg, very hard to the touch and very painful. In October, 1885, the gland softened, and, when lanced, suppurated freely; lower limbs swelled; erysipelas attacked the inflamed gland, scrotum, penis, and inside of thighs, and patient died from septicæmia.

Specimen No. 1891, prov. path., A. M. M., contributed by Dr. John Campbell, medical referee U. S. Pension Office; and Dr. W. M. Gray, on microscopical examination, finds it to be a "large, round-celled alveolar sarcoma."

DETACHMENT OF THE RETINA.

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Some apology seems to be fairly due for the infliction of a paper on a subject in regard to which so much has been written and so little progress made in our knowledge, especially when I can advance no claim to new discoveries or to the solution of the vexed questions of its etiology, pathology, and treatment. But when I consider the statistics of Rydel,[1] who found detachment of the retina to be the cause of blindness in 5 per cent. of all cases, I am impressed that the importance of the subject and of the stimulation of research toward the determination of the essential nature of this disease and of therapeutic means whereby we may remove these veils of blindness from the eyes of our patients pleads for frequent reiteration. This is my apology for the presentation of a trite and well-worn subject.

A man, aged fifty-one years, was admitted to Dr. Pomeroy's clinic at the Manhattan Eye and Ear Hospital, August 24, 1896, and placed under my care. The right eye had been injured eleven years before, the lens was cataractous, the iris at the margin of the pupil was firmly attached to the anterior capsule, vision was reduced to perception of light, and the projection was bad. The vision of the left eye had been gradually failing and suddenly became almost abolished. No history of traumatism to this eye was elicited.

When admitted to the hospital, eccentric vision of the left eye was

3/CC, while direct vision was reduced to perception of light. Several points of detachment of the retina could be seen with the ophthalmoscope, the largest one situated above and to the nasal side, three small ones in the temporal portion about the macula, and two medium-sized ones in the lower part of the fundus.

The patient was placed in bed, where he remained with his eyes bandaged for three weeks, during which time he received almost daily large subcutaneous doses of pilocarpine, sufficient to induce a copious diaphoresis. At the expiration of this time the three small detachments in the temporal part of the fundus were found to have disappeared, and the patient had a direct vision of 7/CC. I then cocainized the eye, turned it well down with fixation forceps, and introduced a Graefe knife through the sclera posterior to and to the nasal side of the insertion of the superior rectus, at the point which seemed to me most propitious for the evacuation of the fluid in the large detachment in the upper and nasal part of the fundus. This operation, which is really of respectable antiquity, has been known for nearly fifty years as Sichel's. After the escape of a considerable quantity of serum the eyes were bathed with a saturated solution of boric acid, a dressing of bichloride vaseline and cotton applied with a bandage, the patient replaced in bed, and subcutaneous injections of pilocarpine maintained three days longer. All medication was then discontinued and the patient allowed out of bed. The two detachments in the lower part of the fundus still remained, but further interference was deemed inadvisable, and the patient was discharged, thirty-five days after his entrance into the hospital, with a direct vision of 18/CC, which, two months later, had increased to 20/CC. This vision was maintained for about eighteen months. The vitreous remained cloudy, so that, although no patches of choroiditis were at any time seen in the fundus, it is probable that this disease is or has been present. The refraction of the eye is emmetropic, and vision cannot be improved by either a concave or a convex lens.

I made no additional attempt to evacuate the contents of the two detachments in the lower part of the fundus, because I feared at the time that further interference would prove disastrous to the gain in vision which I had obtained, and afterward I was deterred by the consideration that, whatever may be the true theory of the pathology of this disease, it seems to be certain that the evacuation of the subretinal fluid does not remove the cause, but only an effect, and experience has abundantly demonstrated that a reaccumulation may be expected unless nature has interfered and cured the pathological process of which we know little or nothing; therefore, after a reattachment of the retina had been secured over the portion of the fundus most important for visual purposes, if the reaccumulation of fluid could be confined to the visually less important part of the fundus, the best chance for prolonged benefit would be afforded the patient. The detachments which were left slowly increased in size, while the central vision remained at the maximum point of improvement obtained—two facts which showed that the disease had not been eradicated, and that the maintenance and increase of these detachments did not appear up to a certain point to exert an injurious effect upon the visual power of the reattached retina. Further than this, I incline to attribute to this factor no inconsiderable portion of the prolonged respite from blindness which this patient enjoyed.

Subsequently, on account of the exclusion of the pupil, which was sufficient to produce what is known as a "crater pupil," I performed an iridectomy on the right eye. On account of the claims formerly advanced by Galezowski, Boucheron, and other French writers in favor of iridectomy as a remedy for detachment of the retina, I felt some interest in noting the projection before and after the operation, but was unable to discover any change.

In March, 1898, eighteen months after the first operation, the sight of the left eye began to deteriorate rather rapidly until, on April 20th, it was only 5/CC. The lens was clear, and the two detachments below were greatly enlarged and appeared to be fused into one. Under cocaine anæsthesia the eye was rotated well upward and Sichel's puncture made near the insertion of the inferior rectus. The patient was placed in bed, with his eyes bandaged as before, and given small doses of pilocarpine hypodermically. A considerable reaction followed, but was soon quieted, and in about ten days he left the hospital with a vision of 16/CC. A few striations of lenticular opacity were noticed at this time. During the summer of 1898 the cataract increased rapidly in opacity, while the projection was as bad as might be expected. About October 1, 1898, I was much surprised to find the projection sharp, quick, and accurate, and, to eliminate any chance of error, had it tested by two other competent gentlemen, who obtained the same result. After consultation with Drs. Pomeroy, Hepburn, Webster, and Emerson it was decided that the patient ought to be given the very slight chance of improvement which extraction of the cataract would afford while the projection was so good. This was accordingly done on October 7, 1898. By an iridectomy I hoped to secure whatever additional advantage might be thus obtained, but the operation failed to secure the desired result. The patient still has only perception of light, through he strenuously contends that his vision is improving.

Prior to the discovery of the ophthalmoscope a collection of watery fluid had occasionally been found in the posterior portion of the eyeball—what was known as dropsy of the vitreous humor—and punctures were made through the tunics of the eyeball posterior to the cornea to evacuate the same. Some observers, as Scarpa and Lawrence,[2] considered this to be a local affection associated with disorganization of the vitreous; while others, including Beer[2] and Jüngken,[2] held that it, like dropsy elsewhere in the body, was symptomatic of some general disease. Among the many conditions quoted by the latter authors are some which may excite a smile to-day, for example, healing of ulcers of the leg and suppression of perspiration of the feet. In extremely rare cases, when the detached portion of the retina lay so far forward that it could be seen by oblique illumination, the actual condition could be recognized, and a case was figured by Wardrop[3] as "dropsy of the choroid coat."

An excellent description of this condition as revealed by the ophthalmoscope in the hands of von Graefe quickly followed the discovery of that instrument, the anatomical site of the lesion was determined, and a strong impulse given to the investigation of the subject. It was soon demonstrated that the appearance of this lesion did not depend on the same causes which induce fluid accumulations in the closed serous sacs —the peritoneum, pleura or meninges—or in the subcutaneous tissue, and the name dropsy was abandoned. At the present time the consensus of opinion seems to be that detachment of the retina is a condition symptomatic of disease or of lesions of certain intra-ocular tissues rather than a purely local disease between the choroid and retina.

It may be dependent on parasites or tumors, and it may be caused by traumatism, but in the majority of cases the exciting cause cannot be positively stated. It is met with most frequently in myopic eyes, and is usually associated with choroiditis and with a degenerated or fluid vitreous; but while these are the commonest accompaniments of this condition, they are insufficient of themselves to explain the appearance of this formidable affection, because an eye may be myopic, afflicted with choroiditis and a fluid vitreous, and may undergo traumatism without having the retina become detached.

In some cases a hereditary predisposition is suggested as possible. Thus Alt[4] found detachment of the retina in three generations of the same family, and Milliken[5] found three brothers, only one of whom was myopic, similarly affected.

Observations in regard to the influences of city and country life upon its production do not agree. Poncet[6] maintains that it is met with more frequently among the rural population, while Gorecki[6] claims the opposite.

When we consider the small proportion of myopes to the population, estimated by Tscherning, of Copenhagen, to be 8 per cent.,[7] the important influence exercised by myopia is demonstrated by the fact that from 48 per cent. to 90 per cent. of the cases of detachment of the retina collated by Rydel,[1] Walter,[8] Hortsmann,[9] and Galezowski[10] were found to be associated with that refractive error. No other one factor appears to be so nearly universally present, but even though we do not agree with Donders that a myopic is a diseased eye, we know that an eye whose walls have become stretched so as to produce axial myopia is less resistant to disease; and as it is evident that this is not necessary for the production of non-traumatic detachment, we can only conclude that myopia is the refractive condition in which an eye is least able to resist the pathological process which results in detachment, and it can therefore be considered to be only a predisposing condition, not an exciting cause.

Detachment of the retina is rarely met with in childhood or adolescence, though Teillar[11] has reported a case of double detachment in a child four years old suffering from whooping-cough. Walter[8] found that below the age of thirty it is usually of traumatic origin. Non-traumatic cases usually occur about middle life. This predisposition of age would seem to indicate affections of the vascular system or disturbance of nutrition as a factor in its production. This indication is corroborated by the fact that inflammatory processes of the uveal tract, particularly of the choroid, are present in a very large proportion of the cases. In a smaller proportion of cases retinitis appears to act as a predisposing cause. But if the diseased condition of choroid or of the retina, or of both combined, were the exciting causes of this lesion, and competent to produce a collection of serum between these coats, or if such a collection should occur as the result of any form of general cachexia, how could an increased tension of the eyeball be avoided if the vitreous body remained normal and of its normal bulk, while the sclera maintained its strength and preserved the form of the eyeball? One of the diagnostic signs by which a tumor of the choroid which presses the retina before it into the vitreous chamber is differentiated from a simple detachment is that in the former the tension is increased, while in the latter it usually remains normal at first, and later becomes diminished. We know that the sclera does not yield, so this phenomenon can only be explained by the theory said to have been first advanced by Heinrich Müller,[12] that the vitreous body becomes diminished in bulk. But such a diminution in bulk argues an abnormal condition, dependent upon either pressure, disease within itself, or interference with the sources of its nutrition—three conditions from which pressure may be excluded by the absence of increased tension of the eyeball. This has long been recognized, and Stilling[13] suggested that condensation of the vitreous would cause traction to be exercised on the retina, and so detach it. This explanation is unsatisfactory, because the retina is not normally attached to the vitreous, and atrophy of the vitreous is not always attended by detachment.

Leber[14] concluded from the study of cases of foreign bodies in the vitreous that the resultant hyalitis caused attachments to be formed between the retina and the vitreous, which later underwent contraction and produced rupture of the retina followed by detachment.

Nordenson, who prosecuted his researches along the lines suggested by Leber, upheld the same view, which is a very probable explanation of the phenomena observed in cases of traumatic detachment, and receives support from a case reported by Axenfeld,[15] in which a rupture of the retina seemed to be clearly due to the organization of a clot in the vitreous and its subsequent contraction.

This theory also receives the support of Randolph,[16] who found in a case of funnel-shaped spontaneous detachment fibrillary degeneration of the vitreous, and on the inner surface of the retina meshes of vitreous fibrillæ, which appeared to be exercising traction upon the surrounding retina. He states that in some places the inner layers of the retina had been pulled out of shape by the vitreous fibrillæ. But that this is in all cases the true theory is at least doubtful. In some cases the presence of traction bands may be detected in the vitreous by means of the ophthalmoscope, but in others a demonstration of fibrillary adhesions between the vitreous and the retina is in no way possible, and to explain these Raehlmann[17] has recourse to what is known as the diffusion theory. This theory presupposes some chemical change whereby the vitreous has been rendered fluid, as well as the existence of a small quantity of a highly albuminous fluid between the retina and choroid, in order that by osmosis through the retina the fluid between the retina and choroid, being less diffusible, may become increased in quantity until sufficient to cause detachment. This theory rests upon the facts that the subretinal fluid is always quite albuminous, while the vitreous contains only a trace of albumin, and that an artificial detachment may be produced by injecting a solution of common salt into the vitreous while the exposed choroid is simultaneously dipped in a solution of albumin. Even in the observations of Randolph[16] can be found support for the idea that osmosis may have taken place through the retina of the eye examined, for he found the vitreous partly composed of fibrillæ partly transformed into granular débris, and also found an exudate of albuminous drops on the external limiting membrane of the retina. But this theory is not perfectly satisfactory, though superior to the older theories of an exudation from the choroid and the escape of fluid vitreous through a rent made in some way in the retina. A theory has been advanced[18] that detachment of the retina may be induced by the powerful contraction and sudden relaxation of the ciliary body. Apart from the fact that this action of the ciliary muscle does not take place in the class of eyes most subject to this lesion, and that the employment of this muscle incident upon the correction of myopia with glasses does not appear to increase the liability to such misfortune, I wish to call attention to the fact that this theory is based upon what I believe to be an essentially erroneous assumption—that a purely physiological process may *per se* cause disease.

The manner in which a detachment of the retina occurs is then uncertain, and equal uncertainty is attached to the seat and nature of the pathological process which is its actual or exciting cause. It is quite possible that more than one pathological process may produce this result, and that different methods of treatment are accordingly applicable. The existence of fibrillary attachments between the retina and the vitreous appears to indicate the pre-existence of a process in the vitreous similar to that known in vascular tissues as plastic inflammation, while in other cases the degenerative changes seem to be chemical and possibly dependent on interference with its nutrient supply. When these problems have been solved treatment may perhaps be instituted with a greater hope of success than that which attends our efforts to-day. Ignorance with regard to such vital matters renders treatment necessarily empirical. The only hope we can extend our patients is based upon the evidence we have that nature does in certain cases arrest the pathological process upon which the lesion depends, and our best efforts are directed toward placing the patient in the condition supposed to be most conducive to her action. Adamük and others have seen cases of temporary detachment in pregnant women. Thompson[20] and Holtz[21] are among those who have reported cases of spontaneous reattachment of the retina. Muglich[22] has collected 136 cases in which replacement took place without operative procedure, and the alleged causes of these cases include most of those to which this lesion is attributed. A retina after detachment usually undergoes serious degenerative changes, especially in the layer of rods and cones, the portion most concerned in the function of vision, as shown by various observers, as Randolph[16] and Muglich,[22] so that the restoration of good vision after replacement of a long-time detached retina is exceedingly improbable, yet Nettleship[23] tells us of a case which demonstrated that visual function may be retained by a retina which has been detached for years, and Schweigger[12] states that he has seen detachment of the retina in patients who were not conscious of impaired vision. But while these cases are sufficiently numerous and striking to indicate the possibility of brilliant therapeutic achievements in the future, the outlook to-day for one of these unfortunate patients is sufficiently grave.

Various modes of treatment have been advocated, most of them directed to the removal of the subretinal serum. Puncture of the eyeball posterior to the cornea was practised for relief of "dropsy of the vitreous." In 1850[24] Sichel punctured the sclera directly through the conjunctiva for detachment. In 1863 von Graefe advised puncture of the retina from beneath, with the object of establishing communication with the vitreous chamber. De Wecker, in 1870, combined these two operations. Wolfe[25] liberated the eyeball from its envelope, so as to render it more freely movable, and thus enable the operator to incise the sclera exactly at the point to which, as determined with the ophthalmoscope, the fluid inclined. Pagenstecher[26] made multiple punctures in the hope of exciting an adhesive chorio-retinitis which would glue the retina in place after the evacuation of the fluid. To obtain the same result Abadie[27] recommended galvano-puncture with a platinum knife, and Straub[28] dissected up the conjunctiva, made two parallel incisions in the sclera, closed the conjunctival wound, and then injected near the scleral wounds two drops of a 1 : 5000 solution of corrosive sublimate with cocaine. Permanent drainage secured by means of the introduction of a thread of gold, catgut, or horsehair has not secured greater permanency of benefit than other measures, while a number of evil results have been reported.

Diaphoresis, obtained by means of jaborandi or pilocarpine, sodium salicylate, potassium iodide, or hot-air baths, is sometimes of equal efficiency with operative procedures in the removal of the subretinal serum and the replacement of the retina; but, in order to secure such a result, it, as well as depletion and counter-irritation in the vicinity of the eyeball, or any other local therapeusis, must be supplemented by absolute bodily rest in bed with the eyes covered by a pressure bandage. Absolute rest is perhaps the most essential factor in the treatment of all cases—sometimes, indeed, appears to be the only necessary portion—and in the present state of our knowledge its importance cannot be too highly estimated.

Recently, through the courtesy of Dr. T. Y. Sutphen, I had the pleasure of examining an eye in which no recurrence of detachment has taken place after the lapse of eleven years. Dr. Sutphen thus briefly states the case in a personal letter:

"After unsuccessful efforts to benefit the patient by diaphoretics and rest in bed, a scleral puncture was made, once only in each eye, the patient being kept for one month upon his back. Two days after the operation the field of vision was found normal in both eyes. In the right there has been no return whatever of the detachment, and at present, eleven years after the operation, the patient has a vision of 20/40 with a — 2 dioptre glass, and reads Jaeger No. 1 at eight inches without glasses. In the left eye the detachment returned within a few weeks. A repetition of the operation in that eye gave no permanent improvement. I believe there is no other case on record of such a lasting result following surgical treatment."

After a reattachment of the retina has been obtained by any one, or by a combination of these measures, it may be well to adopt the advice of Hense,[29] to try to secure permanency of result by inducing the patient to wear for life a pressure bandage.

Within the last few years operations have been undertaken to obtain effects other than the simple evacuation of the subretinal fluid or the induction of a mild, plastic chorio-retinitis. Electricity has been tried,[30] but has not proven more successful than other forms of treatment, and an element of doubt exists whether the improvement in the cases reported was not largely due to the evacuation of a portion of the fluid through the puncture made by the needle in the sclera.

When cicatricial or fibrillary bands appear to exercise traction on the retina, they may, if non-vascular, be divided, and good results after repeated section of such bands have been reported.[31].

Schöler[32] advocated the injection of a minim, or a little more, of a 2½ per cent. solution of potassium iodide in equal parts of tincture of iodine and water, but numerous disasters, including one death, have relegated this procedure to surgical oblivion.

In cases where the degenerated vitreous allowed the retina to float loosely and there was no appearance of the exercise of traction, Deutschmann[31] injected fresh vitreous from a living animal, triturated with some drops of a sterilized salt solution into the vitreous chamber. I have seen this method tried but once, and the result in that case did not tend to remove my impression that this was a crude form of vitreous grafting, which, even under antiseptic precautions, would not be unattended by danger.

Walker[33] has injected a few drops of normal salt solution into the vitreous after evacuation of the subretinal fluid, with temporary improvement, and Jensen[34] has described the similar injection of purified air; but with these methods I have had no experience. I cannot say they appear to me as resting upon a satisfactory basis. The experiments already referred to show that when a salt solution is injected into the vitreous, and the choroid is simultaneously bathed in an albuminous solution, a detachment of the retina occurs. We know that a subretinal effusion is highly albuminous, and therefore the injection of a salt solution into the vitreous in a case of detachment might be expected to increase the trouble, unless, indeed, it should act on the principle of *similia similibus curantur*. Air injected into the vitreous I should expect to soon become absorbed and no benefit to accrue, unless its presence might serve to determine, by some therapeutic action unknown to me, a change in the pathological process toward recovery.

Finally, a person blind from detachment of the retina demands our utmost endeavor to determine, if possible, the actual cause, to restore the best degree of vision in our power, and to maintain the same as long as we are able. If traction bands exist in the vitreous we may divide them; if serous accumulation is great we may evacuate it, but our main reliance must still be upon rest in bed. Our success will vary. It will at times be good, at others only moderate, while in many the final result will hardly seem commensurate with the trouble and annoyance incident to the treatment. But even the occasional rescue of a fellow-being from the darkness of a lifelong night will serve to reward us for our perseverance and urge us on to search for a more perfect way.

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SHOULD THE UNITED STATES PHARMACOPŒIA RECOGNIZE VERATRUM ALBUM AND VERATRUM VIRIDE AS ONE DRUG?

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The question has been raised, in the committee upon the revision of the Pharmacopœia, whether it would be proper for the *United States Pharmacopœia* to allow of the substitution of veratrum album for veratrum viride. The botanical characteristics of the two plants are so similar as to make it probable that they really represent one species. The differences in the histological character of the root, as reported upon by Dr. R. H. Denniston to the Committe on Revision, do not seem to us sufficient to indicate distinctness, and indeed may very probably depend upon accidental influences during growth, such as differences of soil, of moisture, and of age. Specific identity, of course, does not prove exact similarity of physiological powers in two plants, as it is well known that a plant may fail in the production of its active principles under unfavorable circumstances. The hemp of the South and the hemp of the North are medically essentially different in that one is powerful and the other weak. We know of no case, however, in which it has been demonstrated that the same plant is, under different circumstances, possessed of different physiological powers; or, in other words, is capable of producing diverse physiologically active principles.

In the case of the Veratrums of Europe and America it is easily to be conceived that the irregularities in the development of the active principles may result in the production of different physiological activities, because each of these plants has two active alkaloids in them, differing in their physiological range, so that if plant A should produce very largely of the alkaloid X and fail to develop the alkaloid Y, its relations with the human system would be very different from plant B, which produces largely of the alkaloid Y and but little of the alkaloid X.

Under the circumstances, therefore, it is entirely possible that Veratrum album and Veratrum viride may be specifically identical and physiologically diverse, so that only by chemical, clinical, and physiological experiments can their relative values in the sick-room be determined. Denniston states that Veratrum album contains about five times as much alkaloid as does Veratrum viride; but, as we shall show later, it is probable that the alkaloidal strength of each drug varies very greatly in union with differences of climate and soil, and especially in proportion as the individual specimen is composed solely of rhizomes or contains masses of comparatively inert rootlets. Prof. Kraemer is, we believe, about to undertake a chemical study of the present subject, so that we shall know more from the chemical stand-point.

The symptoms which are produced by poisonous doses of Veratrum viride are certainly in many respects similar to those which have been noted as present in the recorded cases of poisoning with the Veratrum album or white hellebore. It is commonly stated, however, that in poisoning with Veratrum viride the bowels are not disturbed, while there is uniformily violent purgation after the toxic dose of Veratrum album. This difference, however, appears not to be as constant as has been believed. Thus, while it seems certain that there is usually little or no effect produced by the largest doses of Veratrum viride upon the intestinal tract, the cases reported by Dr. E. M. Pendleton and by Dr. E. Platt (*Stillé's Therapeutics*, vol. ii., fourth edition, p. 296) show that occasionally Veratrum viride does produce very watery evacuations. On the other hand, an examination of recorded cases shows that white hellebore or Veratrum album does not always purge, as shown in the case reported by Dr. Rayner, also cited by Prof. Stillé. Further, in six cases of poisoning reported by Mavel (*Journ. de Chim. Méd.*, 1851, third series, vii. p. 586); in one reported by M. A. Chevallier (*Ann. d'Hyg.* Paris, 1877, second series, xlviii. p. 459), and in one reported by J. Giles (*Lancet*, Lond., 1857, ii. p. 9), purging appears not to have been present. On the other hand, in three cases which were medicolegally examined and reported upon by Nivet and Giraud (*Gaz. Hebd. de Méd.* Paris, 1861, viii. p. 499), there was much purging, in one instance with excessive tenesmus and bloody stools. In a case reported by Dr. E. Peugnet (*New York Medical Record*, 1872, vol. ii.), in which half an ounce of the homœopathic mother tincture of Veratrum album was taken, the purging was excessive, and both vomit and stools contained blood.

The truth would seem to be that purging may be produced by the toxic dose of either Veratrum viride or Veratrum album; but whereas it is a rare symptom in Veratrum viride poisoning, it is a common symptom in poisoning by Veratrum album; further, in so far as we know, in no case of Veratrum viride poisoning has the purging been so severe as it frequently is in poisoning by Veratrum album.

For the purposes of experimental research we were furnished by Prof. Henry Kraemer with three specimens, 500 grammes each, of No. 1, veratrum viride; No. 2, Veratrum album, with the rhizome only; No. 3, veratrum album, with the rhizome and roots. From these crude drugs were made, under the supervision of Prof. Remington at the College of Pharmacy, fluid extracts which were used by us. The first series of experiments was made upon frogs. The results were entirely concordant, and it is, of course, not necessary here to give in detail more than two experiments as examples. The frogs used were of the same species; were taken without selection out of a large lot originally obtained for the purposes of the physiological laboratory of the University of Pennsylvania, some weeks before the date of our experiments, and kept in a well-regulated frog-cage.

In the first series uninjured frogs were employed; in the second Turck's method was used.

EXPERIMENTS OF DECEMBER 29.

Time	*Veratrum Album (Phila.).* Frog weighed 26.5 gm.	Time.	*Veratrum Viride.* Frog weighed 39.5 gm.
3.34	Injected 0.50 c.c. into posterior lymph sac (some escaped).	3.35	Injected 0.75 c.c. (some lost).
3 35	Paralysis of right hind leg.		
3.37	Paralysis of both hind legs; do not respond to strong HNO_3	3.38	Reflexes much diminished, but not gone.
		3.28½	Reflexes gone in hind legs, do not respond to strong HNO_3.
3.38	Reflexes gone in front legs.	3.39	Reflexes gone in front legs; eye reflexes present.
		3.40	Convulsive movements.
3.42	Eye reflexes gone, heart still beating.	3.41	Eye reflexes gone, heart still beating.

TURCK'S METHOD.

Metronome beats 160 per minute, ¼ per cent. H_2SO_4 to test reflexes.

Veratrum Album.

Frog weighed 28.0 gm.

Time.	Reaction time.
3.50	6 beats.
3.56	6 beats.
4.01	7 beats.
4.04	7 beats.
4.06	Injected ¼ c.c. of 50 per cent. solution of v. album.
4.08	7 beats.
4.13	21 beats, response feeble, right foot.
4.16	13 beats for left foot.
4.17	40 beats (right foot), no response.
4.20	23 beats (left foot), feeble response. ½ per ct. acid used, both feet immersed.
4.23	10 beats.
4.26	13 beats.
4.29	15 beats, feeble response.
4.32	No response.
4.35	No response to 50 per cent. H_2SO_4; strong convulsions when probe run down spine.

Veratrum Viride.

Frog weighed 27.0 gm.

Time.	Reaction time.
3.53	5 beats.
3.57	7 beats.
4.02	6 beats.
4.05	5 beats.
4.07	Injected ¼ c.c. of 50 per cent. solution of v. viride.
4.10	5 beats.
4.14	9 beats.
4.18	10 beats, right foot,
4 19	40 beats (left foot), no response.
4.21	40 beats (right foot), no response.
4.24	No response.
4.25	No response to 50 per cent. H_2SO_4.

Slight convulsion when probe run down spine.

So far as our experiments upon frogs are concerned, no qualitative differences could be perceived between the action of the two veratrums. An inspection of the experiments given above will show that if there be any inequality of strength the Veratrum viride is the more powerful. Qualitative experiments, however, upon the lower animals are apt to be misleading, because of the differences in the rate of absorption and of susceptibility in different individuals of the same species; and, in order to reach any conclusion from frogs, much more numerous experiments would have to be made than it seemed to us worth while to do. Further, the results obtained in experiments not here detailed did not agree with those above given, the Veratrum album appearing in some cases to be stronger than veratrum viride. On the whole, our experiments lead to the conclusion that there is no distinct qualitative or quantitative difference in the action of Veratrum album and Veratrum viride upon frogs.

In the next series of experiments mammals were poisoned without the performance of any operative procedures.

The general experiments upon the lower animals were made with Veratrum album (eight) and with Veratrum viride (three) upon rabbits, and one experiment with Veratrum album upon a dog. A greater number of experiments were made with Veratrum album, on account of our familiarity with the effects from previous experiments with Veratrum viride. The symptoms did not differ in the two cases. After small, fatal doses there was a progressive weakness, lessened reflexes, accompanied in the rabbit with peculiar movements, resembling those of vomiting, and in the dog by vomiting. After very large fatal doses there were violent convulsions, with paralysis, and death by failure of the respiration, although the heart was, throughout the poisoning, profoundly affected.

In no case was there violent purging produced either by Veratrum viride or Veratrum album. In some of the cases of Veratrum viride poisoning there was a slight discharge of normal feces, while very moderate purging was occasionally noted in poisoning with Veratrum album.

As already stated, comparative experiments to settle the relative strength of a drug, unless carried out on a very large scale, are of very little value. The results of the experiments are, however, shown in the following table, which would appear to demonstrate that the Veratrum album bought in New York is very much stronger than the Veratrum album bought in Philadelphia, this latter being about the same strength as Veratrum viride. The Veratrum album bought in New York was composed simply of rhizomes; the Veratrum album bought in Philadelphia contained very many rootlets. As the alkaloids are chiefly found in the rhizomes, it is evident that the strength of a fluid extract must largely depend upon whether the crude drug from which it has been produced is composed solely of rhizomes or largely of rootlets.

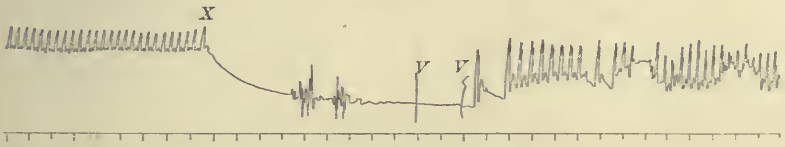
Dose per kilo.	Veratrum album (Philadelphia).	Veratrum album (New York).	Veratrum viride.
0.20 c.c.	....	Death in 20 minutes.	
0.25 "	Death in 42 minutes.	Death in 14 minutes.	
0.5 "	Death in 25 minutes.		
0.75 "	... .	....	Death in 16 minutes.
1.0 "	Death in 14 minutes.	....	Death in 12 minutes.

The next series of experiments were manometrical studies in regard to the effect of drugs upon blood-pressure. Of these we have made a large number, but have not been able to perceive any distinct difference in the action of Veratrum album and Veratrum viride upon the circulation. The general effects are for the most part concordant with the results of previous investigators, the only point in which the effects differed from what we expected being in the first action of a very large dose upon the inhibitory cardiac nerves.

It is now many years since Dr. H. C. Wood published his articles upon the action of the alkaloids of Veratrum viride. In these it was noted that the veratroidine was an extremely powerful stimulant to the inhibitory nerves, so that it was possible to produce by it a cardiac arrest, which was immediately put an end to by section of the vagi. It has been generally believed, however, that the veratroidine was in such small proportion in the drug that its action could not be demonstrated with cruder preparations than the separated alkaloid. We append, however, two tracings (Figs. 1 and 2), made with a Hürthl spring manometer, Veratrum album having been used in the one, Veratrum viride in the other. The similarity of the action will be at once apparent, only the results following the section of the vagi seem to be a little more pronounced in the case in which Veratrum album was used. The doses in the two experiments were very nearly the same—kilo for kilo.

From our manometrical studies we would state the following conclusions: First, Veratrum viride and Veratrum album act similarly upon the circulation; second, after each the respirations usually cease before the heart-beats, though occasionally the reverse happens, and when artificial respiration is practised there is finally diastolic cardiac arrest; third, any dose of either poison which is sufficient to produce a demonstrable effect upon the circulation causes a fall of arterial pressure which, at least in its early stages, is not solely or chiefly due to the vasomotor paralysis, since asphyxia produces an immediate rise of mercury in the manometer. Later in the poisoning, if the dose has been large enough, vasomotor paralysis is developed, since asphyxia, even while the heart is still acting with some force, is powerless to elevate the arterial pressure. When the poison is injected directly into the jugular vein there is an immediate fall of the arterial pressure, the extent of the fall depending upon the dose. The heart may be arrested at once, and, when exposed, be incapable of responding at all to stimuli; or there may be a cardiac arrest, which finally recovers itself completely, or which at once disappears upon section of the vagi.

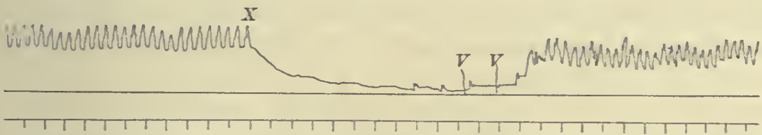
FIG. 1.



Hürthl spring manometer.

Dog, weight 10.3 kilos. × injection of 1.5 c.c. of 25 per cent. solution of fluid extract of Veratrum album into jugular vein. *V V* section of vagi one after the other.

FIG. 2.

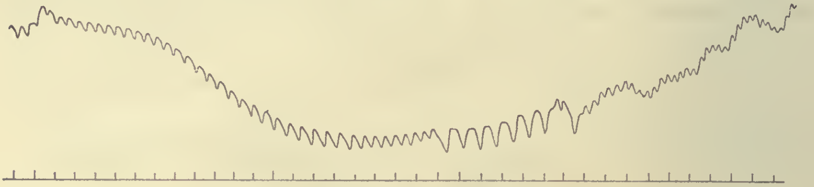


Dog, weight 12.6 kilos. × injection of 1.75 c.c. of 25 per cent. solution of fluid extract of Veratrum viride into jugular vein. *V V* section of vagi one after the other.

As demonstrating this and as showing the similarity of the action of the two drugs, we give two tracings, Figs. 1 and 2. It is certain that the sudden arrest of the heart's action may be due to the influence of the drug upon the heart's muscle; but our results are in accord with those published by Dr. H. C. Wood many years ago, which showed that the main cardiac action of one of the alkaloids is upon the vagi. In this experiment there had been complete paralysis of the pneumogastrics by atropine before the administration of the Veratrum album.

Contrasting the tracing, Fig. 3, with the other records, it will be seen that, although the dose was much larger than was given in Figs. 1 and 2, the fall of pressure was much less and the arrest of the heart's action not complete, so that it would appear as though the drug exerts a double cardiac action, depressing the muscle and at the same time increasing the activity of inhibition.

FIG. 3.



Tracing with mercurial manometer.

Dog, weight 11 kilos. Vagi paralyzed with atropine. × injection into the jugular of 2 c.c. fluid extract of Veratrum album solution.

As the result of our whole series of experiments, we conclude that the only evidence which we have been able to obtain of differences in the action of Veratrum viride and Veratrum album is that Veratrum album more frequently purges man when taken in toxic doses than does Veratrum viride, and that some specimens of Veratrum album are stronger than are some specimens of Veratrum viride. On the other hand, it would seem, however, probable, or even assured by our experiments that different specimens of Veratrum viride may vary greatly in their strength, and that some specimens of Veratrum viride may be stronger than some specimens of Veratrum album. It is not probable that a clinician would be able to perceive any difference in the action of the therapeutic dose of the two plants, so that it would be proper for the *Pharmacopœia* to recognize both species, if any advantage could be gained by so doing. A national pharmacopœia should, however, according to our thinking, favor the use of American drugs when it can do so without injury to any one. The recognition of Veratrum album would be an aid in the substitution of an American by a foreign drug which now has very little vogue in our markets, and which possesses no advantages whatever over its American representatives. Any difference which may possibly exist between the two Veratrums is in favor of the American drug as less apt to disturb intestinal digestion. Under such circumstances the recognition by the *United States Pharmacopœia* of the European drug seems to us of doubtful expediency.

CRITICAL SUMMARY

OF THE

QUESTION OF FATTY DEGENERATION.

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The question of fatty degeneration, so called, is entangled in the question of the relations of the nitrogenous to the carbonous metabolism as exemplified in the carbohydrates and hydrocarbons. We need to know the following in connection with the processes known as fat metamorphoses: What are these fats? Do they differ from the physiological fats? Whence are they derived? These questions presuppose a knowledge of the physiological fats, their origin, and their uses, and to a certain extent the pathological questions await the solution of the physiological questions. In theory, however, the interdependence need not be complete; even were it shown that physiologically fats are or are not produced from proteids, the contrary would still be possible under pathological conditions. The same holds true for comparative studies; the formation of fat in plants need in no wise correspond to the procedure in animals. Nevertheless, biological reasoning by analogy is of great value, and in the study of fatty degeneration we are largely thrown upon such studies, since direct investigations in connection with diseases are very difficult to institute, and are attended by almost countless opportunities for error and fallacy.

The current pathological teaching is that in fatty degeneration the proteids of the diseased cells become converted into fats. Virchow and Klebs are largely responsible for this, and Klebs's ideas and work were chiefly based upon those of the elder Voit. In general pathological literature no explanation or discussion of worth attends the statement quoted. For this serious error of thus dismissing with an unequivocal statement one of the most fundamental problems of biology there is no excuse, and it constitutes a most flagrant violation of pedagogic principles.

Fats may be conceived as derived either from fats, from carbohydrates, or from proteids. We know that fats may be absorbed as such, unchanged. We know that in the process of digestion fats are usually broken up into their respective acids, which combine with bases; from these compounds, after their absorption, fats are re-formed. All fats seem to be absorbed by the lymphatic apparatus. Once in the body they are stored for immediate or future use. In the process of calorification they are probably burned as such. So far as we know fats are never formed from glycogen or glucosides; glycogen is converted into sugar, and from this fats may undoubtedly be formed. To what extent they are thus formed from sugar we do not know. For example, a person is upon a diet which contains a sufficient quantity of proteid and an excess of carbohydrates and fats; he lays on flesh, but we do not know whether he burns his sugars and deposits the ingested fats, or whether he burns his fats to a certain extent and converts the excess of the sugars into fats and deposits them. As a principle of economic mechanism it is natural to suppose that the sugars would be burned and the fats deposited, but we have no right to assume that all physiological processes are in conformity to the laws of economical mechanics. The relations of the fats to the sugars are of subsidiary importance in the question under discussion; our chief concern is with the relations of the fats to the proteids.

There are obviously three avenues by which this problem may be approached. The first is by the experimental study of various diets and their effects upon the metabolism; the second is by a study of the body fats; the third is by the experimental production of fatty degeneration and the processes which attend them. Obviously these may be combined, the last two with especial advantage. In considering the experiments which have been carried out in these connections, it must not be forgotten that analogies drawn from synthetical laboratory work cannot be rigidly applied to these questions. It is probably true that under the influence of mineral acids and high temperatures carbohydrates may be produced from proteids; it is probably true that lactic, valerianic, and butyric acids may be made from proteids, and that from lactates fatty acids may be derived by the action of alkalies or high temperatures; and it is true that some bacteria form fatty acids and fat from nitrogenous substances, as in the ripening of cheese; but all of these do not prove or even indicate that such processes take place within the living body. Urea may be easily formed from cyanides; it is not so derived in actual life. There has been a great deal written upon fatty degeneration, but there has been little work done. No attempt is made in this summary to review anything but original work directly bearing upon the problem.

The earliest direct experimental work was done by Hoppe[1] (Hoppe-

Seyler). He fed a dog first on sugar, and then on meat and sugar, and found that more CO_2 was eliminated upon the meat-and-sugar-diet than upon the sugar-diet, while on the mixed diet less urea was passed. Since the gain in weight was more marked upon the mixed-diet than upon the sugar-diet, he concluded that some of the fat was formed from the meat of the diet. He conceded that his calculations were not exact, and overlooked entirely the fact that an increase in weight might not have been due to fat at all, but to water. The experiment proved nothing, but simply illustrated that carbohydrates enabled the body to economize upon its nitrogenous metabolism.

C. Voit[2] then took up the question, and the Munich school has since produced the sponsors of proteids as sources of fats. Their experiments were partly dietetic and partly metabolic, consisting of total nitrogen and carbon estimations. They fed dogs upon a known quantity of meat, and then determined the quantities of nitrogen and carbon eliminated. They found all the nitrogen passed out, but a part of the carbon (14 to 18 per cent.) was retained. This retention they considered to have been in the form of fat, the process being that the molecule of albumin was broken up into a nitrogenous and a non-nitrogenous moiety; the nitrogenous moiety was broken up and appeared largely as urea, while the non-nitrogenous moiety, instead of being oxidized to CO_2 and H_2O, was retained as fat. They conceived nearly all the body-fats as derived from the proteids, directly or indirectly; even in herbivora they did not think carbohydrates were to any extent converted into fats. The process from proteids to fats they represented as a reduction which caused a consumption of energy; the formation of glycogen from proteids, however, was a simple oxidation. Thus the actual *modus operandi* of the formation of fats from proteids was never explained by them. Voit constantly quoted the fatty degenerations, phosphorus poisoning, and the adipoceration of ripening cheese in support of his view, and did not seem conscious of the fact that by so doing he was attempting to prove each by the other. The work of Voit and his students, on the one hand, and the weight of the current pathological teaching upon the other, seemed to settle the matter, and for twenty years little work was done in relation to it. Liebig objected that the meat used in their diets was not fat-free, but without effect.

In the course of a life's work upon the sources of muscular energy Pflueger reached general ideas which did not harmonize with those of Voit. He therefore took up the matter, and in several articles[3] criticised in detail the theory of the formation of fats from proteids. He demonstrated (what has later been admitted by students of Voit[4 6]) that the coefficient employed by Voit was incorrect, being too high. Voit had fed his animals on meat which he had not analyzed, but calculated on the basis of now admittedly incorrect analyses. He assumed that his meat contained 3.4 per cent. of nitrogen, which was probably too low, and in any event was not accurate. This amounted to 14.11 per cent. of nitrogen in the dried residue, but a fluctuation would result from the inconstancy of the water. He assumed that the carbon was 51.95 per cent. of the dried residue, which was higher than current figures; it may have been too high, in any event was not derived by analysis. The coefficient derived from the relation of nitrogen to carbon was therefore too high, because he had used a low figure for nitrogen and a high figure for carbon. Voit's calculations also obviously assumed that all the nitrogen and carbon of meat were in the form of proteid; they are not, and the more non-proteid nitrogen there was the greater would be the proportionate reduction of the meat, since these substances were eliminated almost unchanged. We know the muscles contain some more glycogen and glucosides and a great deal more fat than Voit supposed; since these might not have been oxidized but stored, they alone would have given a carbon retention. When Voit's figures are recalculated with the correct coefficient the carbon retention disappears. Even though the fat formation (carbon retention) he described had occurred, it might still have been due to the fat and glycogen in the diet he employed. Pflueger also pointed out that although there was in Voit's figures a urinary nitrogen balance, there was at the same time a marked increase in weight, which was contrary to his wide experience with pure meat diets. This, therefore, confirmed the fact that Voit had judged the nitrogen in his diet too low, and that the animals had retained nitrogen as well as carbon. Other questionable factors in Voit's work were the paucity of water given to the animals, the method employed (Liebeg's) for the determination of the urea and the irregular fluctuations in it, and his results in the estimation of the feces, and of oxygen in the respiration apparatus. It is clear that these experiments of Voit's in nowise proved a derivation of fats from proteids.

E. Voit repeated the experiments, and in his calculations employed a lower coefficient—3.29. He admitted that in the earlier experiments of C. Voit it was an error not to have analyzed the meat and to have inferred from a gain in weight a gain in fat. He fed a dog with washed meat and some albumin; the experiment lasted three days, and was apparently not preceded by starving, nor were the stools stated to have been marked off. The meat was not analyzed for fats or glycogen. He found a slight nitrogen retention and a larger carbon retention, which he attributed to fat formation and not to glycogen formation, "because that was not probable." Our more recent knowledge of the fats and glycogen in muscles have still further reduced the carbon-nitrogen coefficient, so that E. Voit's figure was still much too high. The assumption that the carbon was retained in the form of a fat was by no means obvious; as Pflueger[5] showed, substances which arise during the reduction of the proteid molecule, as tyrosin, could well have accounted for it. The essential difference between these experiments and the older ones of C. Voit lay in the fact that while C. Voit noted only a carbon retention, E. Voit noted both a nitrogen and a carbon retention. Therefore, it was all the more necessary to show that the retentions were in the form of fat and not in the form of other substances, particularly as the diet in these experiments was abnormally heavy in proteids. That demonstration E. Voit did not give.

Cremer[6] took up the subject in the same line as E. Voit. He overfed starved cats on meats, and stated that about 17 per cent. of the carbon of the meat was retained in the form of fats. He stated that his meat was free from fat and glycogen, but did not state how he knew it was so, nor how he obtained it so. He fed his cats three times the normal diet for eight days, but did not determine how much lay in the digestive tract at the end of the experiment. About 12 per cent. of the nitrogen and about 27 per cent. of the carbon were retained. In the digestive tract of a cat on a meat diet putrefactive processes are active, but fermentative processes are inactive. Of any of the excessive diet retained in the tract, the proteids would have been broken up into highly nitrogenous substances, as ammonia and extractives, which, being easily absorbed, would have entered the blood and been eliminated by the kidneys; in the meanwhile the carbonous substances of the proteids would have remained in the tract, and would in the calculations have been incorrectly credited to fats in the body; a retention and putrefaction of 10 per cent. would more than have accounted for the results. Another error lay in the use of beef, since it was obviously calculated that the beef and the tissue the cat formed from it were of identical composition; obviously the difference should have been determined and allowed for, or cat's meat employed in the diet. And, lastly, Cremer failed entirely to demonstrate that the carbon held to have been retained was retained as fat or glycogen, and not in substances in combination with the nitrogen, which was also retained. There is no doubt that Pflueger's criticisms[5] of this work have shown its entire unreliability. It is clear that not only has it never been shown in diet experiments that fats are directly or indirectly formed from proteids, but it is certain that no decision can be reached in this way unless a pure proteid is employed as the diet, and even then all the inherent difficulties of the method will not have been overcome.

The direct study of the fat metabolism has given more definite results. Subbotin[7] fed dogs, made thin by starvation, on pure meat with isolated forms of fat; one had meat with palmin, another with an olein-free soap. He found stearin and olein in the body-fats, and concluded that these must have come from the proteids of the diet, since the dog and the diet were supposed to have been free of fat and glycogen except for the palmin and olein ingested. These experiments simply proved that the dog could re-form its own type of mixed fat from palmin or olein. In all probability the dog was not freed of its carbohydrates by the starvation, and the period was not long enough to have freed the body of its stored-up fats; nor could the diet, according to our present knowledge, have been assumed to have been even approximately free of fat and glycogen. Munk,[8] in addition, was able to show an error in Subbotin's work, and that palmin, as such, was deposited by the dog, so that the experiment proved nothing for fat-formation.

Subbotin[9] stated that the milk of bitches fed on a meat diet was richer in fats than when the animals were fed on a mixed diet. Voit[2] made the same statement, and Kemmerich[10] stated that the fat in the milk might exceed the fats (not fats and carbohydrates) in the diet. Voit himself admitted that against the interpretation of these facts as proofs of a formation of fats from proteids would be the obvious objection that the milk-fats could have come from the body-fats; this he declared improbable, but made no attempts to disprove it. The later work of Rosenfeld has nullified Voit's interpretation.

Radziejewski[11] fed a lean dog on meat and seal-oil, but was not able to demonstrate in the body the erucin of the seal-oil. Munk[8] repeated the studies, and was able to show that erucin was in the tissues—*i. e.*, that the seal-oil had been absorbed unchanged. Subbotin[7] tried the experiment with spermaceti, but failed. Lebedeff[12] fed a lean dog on mutton-fat and linseed oil, and was able to find both in the tissues. He also[13] fed a lean dog for ten days on meat and linseed oil, then poisoned the dog with phosphorous and killed it on the fourth day; the phosphorous liver was full of fat, and of this two-thirds was linseed oil. The objection that the oil might simply have been lodged in the liver could not hold, for it is known that the fats are not absorbed through the portal circulation. In other experiments he likewise found that foreign fats were deposited in the liver.

Rosenfeld[14] has demonstrated that when dogs were starved and then fed on mutton-suet they absorbed and deposited this fat unchanged, and it was conclusively demonstrated as such in the tissues. When these animals were again starved the fats disappeared from the liver. Then the animals were given phloridzin; there was a marked fatty change in the liver; this fat was mutton-fat, which had been transferred from other tissues to the liver, and was not formed there; the liver in the meantime has lost but little of its nitrogen. The same experiments were repeated with phosphorous poisoning, and again it was shown that the fat in the liver was mutton-fat, which had been stored from the diet, and not dog-fat at all. He also showed that badly starved fowls did not present a fatty liver after phosphorous poisoning, while fowls in good nutrition did so. Rosenfeld finally applied his method of study to the milk, the classical example of the formation of fats from proteids. He starved a bitch and then fattened her with mutton-suet. She was then impregnated, and during gestation was fed on lean beef. She aborted, but presented a good secretion of milk. The fat in this milk was mutton-fat. Thus Rosenfeld proved that in poisoning by phloridzin and phosphorous and in the milk of animals subjected to a previous fattening with mutton-fat, the fat was not derived from the proteids, but from the body-fats; the process was an infiltration, and not a degeneration. These experiments have refuted nearly all the older views on fatty degeneration to which Voit used to appeal for support.

Bauer[15] had analyzed isolated pieces of tissues of animals with phosphorous poisoning and found them to contain more fat than the normal tissues. Since Storch,[16] Schultheissen and Riess,[17] and Fränkel[18] showed that the urea was increased in connection with phosphorous poisoning the inference lay close at hand that the fats had been formed from the disintegrated proteids. In fact, the inference was an assumption. It did not follow at all that because the urea was increased that only the nitrogenous and not the carbonous moiety of the proteid was destroyed. Analyses of small pieces of tissue could not prove whether the fat in the whole body was increased or not, since the water, the salts, the glycogen, and the conditions of metabolism at the time of death can and constantly do produce such individual variations that from such analyses almost any postulate could have been supported. Furthermore, the fat in local areas could have been an infiltration; and in any event the fat metabolism may have been decreased in phosphorous poisoning, which, in connection with the exaggerated proteid disintegration, would have produced a deceptive appearance of fat production. Saikowsky[19] showed that the phosphorous liver was almost free from glycogen, from which a notable quantity of fat could have been derived.

Monaco[20] studied the metabolism of mice poisoned with phosphorous, and was able to show that the respiratory exchange was not decreased, and that the urinary nitrogen was but little increased. These results were in direct contradiction to those of Bauer.

It is obvious that, apart from such experiments as those of Rosenfeld, the fat metabolism of phosphorous poisoning can be well studied only in small animals which can be analyzed entire at the close of the experiments. It would obviously be of further advantage to utilize such animals as can be starved (since it is practically impossible to use a proteid diet and sugar-free diet) without detriment to their metabolism, as hibernating animals. The first of these desiderata seems to have originally occurred to Leo.[21] His experiments were divided into three series. In the first series he took young guinea-pigs, and, after weighing them, after a five days' starvation poisoned one with phosphorous; both were killed on the third day. The poisoned pig contained much more of matters extractable by ether than did the unpoisoned pig. In the second series he starved two rats, of similar litters, size, and rations for five days, and poisoned one with phosphorous; he killed them on the fourth day, and found, on analyses, that the poisoned rat contained less substance extractable in ether than did the unpoisoned animal. In the third series he used frogs, which were divided into three groups of six each. The poisoned frogs showed a larger amount of matters extractable in ether than did the unpoisoned frogs. From these studies Leo concluded that fat was produced from proteids in phosphorous poisoning; the contrary results in the experiments with the rats he explained by assuming that there had been an excessive combustion of fats, for which there was no proof. There were many apparent fallacies in Leo's work. He did not determine the fats, but only the total substance extractable in ether—a method of fat estimation which has no standing to-day, since many other substances—cholesterin, pigments, etc.—were included. He did not employ animals of the same sex, which was especially essential in frogs, in which he obtained his most striking results. He did not employ animals of equal weight. He made no attempt to exclude other substances, as glycogen, from which the fat might have been derived. Hoppe-Seyler[1] had in his work expressed the idea that it was from the lecethins that fats were indirectly derived from proteids: in this work Leo found the lecethins not increased, thus disproving Hoppe-Seyler's view.

Schmidt[22] made similar experiments on young pigeons of similar age, size, and rations. All were starved through the period of experimentation, two were poisoned with phosphorous. He found rather less fat in the poisoned than in the unpoisoned animals.

The publication of Bergeat[23] contained the positive statement that he has been able to demonstrate the formation of fat from proteid in rats poisoned by phosphorous. He gave no details of methods nor protocol of results, and his statements cannot therefore be discussed or considered.

Polimanti[24] next took up the matter. He found that male and female frogs have widely different quantities of fat. He therefore selected male frogs, which possess the least fat, removed the fatty bodies by operation, and then divided the animals into two groups and submitted one group to phosphorous poisoning. He found that the poisoned animals contained more fat than the unpoisoned. Since the animals had had no food, and assuming that they did not contain enough glycogen to account for the increase in fat, he concluded that fat had been formed from proteids.

Polimanti's procedures included several errors which Pflueger[25] pointed out. He had weighed his frogs when dead, and not at the beginning of the experiments. Obviously he assumed that during an eight-day course of phosphorous poisoning the weight of the frogs remained constant, and that of this weight the solid constituents remained the same. This we know cannot have been true, since phosphorous poisoning produces an increase of metabolic disintegration, as evidenced by the increase of urea passed. Therefore, since the frogs lost solid matters, a higher percentage of fat in the dried residue might simply have corresponded to this loss, and not have represented a gain in fat at all, since the fats were not disintegrated to the same extent as were the proteids. What we need to know is the relation of the fats to the weight of the healthy frogs before the poisoning. He used larger frogs for his experiments and smaller frogs for his controls, which vitiated the results, since we know that as a rule larger animals have a higher percentage of fat than the smaller. Pflueger showed by careful analyses that frogs contained more glycogen than was necessary to account for the apparent (not real) increase in fat in Polimanti's frogs, and thus robbed his conclusions of their validity. It is now clear that the question can be decided by selecting frogs of the same kind, sex, and size, poisoning a part of them, and then comparing in the two series the quantity of fat, glycogen, and proteid (nitrogen) of the entire series with the live weight before the experimentation. This has not yet been done, and the demonstration of the origin of fats from proteids in phosphorized animals has not yet been produced, while against it stand the clear results of Rosenfeld.

A few other aspects of the question deserve a moment's notice. Hoffman[26] took the eggs of musca vomitoria and divided the quantity in halves. One portion he analyzed for fats; the other portion he allowed to hatch out upon a blood of a low and known fat and sugar content. When the insects were grown he analyzed them, and found that they contained ten times as much fat as did the original eggs. This fat, he concluded, must have been made from the proteids. As Pflueger[3] pointed out, however, this fat was probably formed by bacteria and then taken up by the insects. We know that in the ripening of cheese, in the putrefaction of proteids, and in the condition known as adipocere, large quantities of fat and fatty acids are formed by bacterial action. This explanation, in all probability, holds for the experiments of Hoffman.

As for the fatty changes in the dead extra-uterine fœtus, long held to have been due to a metamorphosis, we now know that it is an infiltration, just as the lime-salts in the lithopædion are an infiltration. The work of Reinhard[27] and Virchow[28] on the formation of cholesterin did not prove much at the time, and has been entirely destroyed as evidence in this matter by the work of Rosenfeld. The later statement of Virchow, that chemistry alone, and not microscopy, could decide the question of fatty degeneration, holds true to-day.

The position and appearance of fat granules within degenerated cells proves nothing for the origin of the fats. Even though it were conceded that the fat was formed within the cell, it could more probably have been formed from the carbonous compounds—sugar, glycogen, glucosides, and mucin, which abound in cells—than from the proteids. It is especially in the muscle, liver, and epithelium that fatty degenerations are most marked, and it is in them that the carbonous substances are most abundant.

It has long been known that when porous foreign bodies are placed in the living body, as in the lymphatic spaces, fatty degenerations may occur in the cells which have wandered in, and this has been looked upon as a good illustration of fatty metamorphosis. Apart from the fact that leucocytes contain glycogen which might have been the origin of the fat, what we know now of the pith experiment through the work of Arnold and others forces us to conclude that the fats are deposited by wandering cells and do not originate in the cells within the foreign bodies.

A careful review of the subject thus leads us to the following conclusions: 1. The formation of fats out of the proteids physiologically has not been demonstrated or made probable. 2. A formation of fats out of proteids pathologically has not been demonstrated. On the contrary, the weight of evidence is against it and in favor of the conception of the so-called fatty metamorphosis as infiltrations or formations of fat from carbohydrates. This position is provisional, and not conclusive. No one pretends to-day that the formation of fat from proteids is impossible; it has simply not been demonstrated or even made plausible. Future work must confirm or reverse our present conclusions.

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SOME RECENT LITERATURE REGARDING CANCER.

A CRITICAL REVIEW.

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The April number of the *Practitioner* is devoted wholly to treatises on the subject of cancer. The statistics collected in the office of the Registrar-General, which has been established for the past forty years in England, would seem to indicate that there was an alarming increase of cancer in the population of England and Wales. Attempts have been made to explain this on the hypothesis that in the past decade preventive medicine has made such rapid strides that there is a larger survival to adult age now than aforetime. Supposing this to be true, is the number of survivors to the cancer age so much greater as to explain the increase in the cancer death-rate? And if not, what proportion can be thus explained? Referring to the Registrar-General's statistics, it is found that out of every million living at all ages the number of males aged twenty-five and upward was 214,644 in 1881–1890 as compared with 214,566 in 1871–1880. These figures furnish no assistance to account for the great increase in the registered mortality of cancer. Dr. Arthur Newsholm asserts that the increase is not a real one, but only apparent, and is due to more accurate methods of diagnosis and to more careful certification of the causes of death, more especially the latter. The greater increase of cancer among males is cited as confirmatory of this view, since it is known that cancer in the male is more frequently internal, and therefore more difficult of diagnosis than in the female; but clinical methods employed in formulating different diagnoses have been so elaborated as to render it possible at the present time to recognize cancer more frequently than heretofore. So, too, the greater number of autopsies that are held to-day will account undoubtedly for no small proportion of the increased number of cancer registrations. This can be proven by turning to the statistics of hospitals, where autopsies have now become the rule rather than the exception. Whether this increase is apparent or real, the fact remains that cancer is among the most deadly diseases, causing about 6 per cent. of the total deaths registered among males and more than 7 per cent. of deaths registered among females, at ages over forty-five years.

The statistics collected by Dr. Tatham, showing the cancer mortality according to occupation, would seem to teach us that the latter plays no important rôle in the etiology of cancer. The only deduction that can be drawn is that among those occupations in which one finds a more or less intemperate class of men the mortality is higher. The figures for commercial travellers, coachmen, seamen, innkeepers, brewers, maltsters, and butchers certainly point in this direction.

Roswell Park, in his contribution to this series of articles, "A Further Inquiry into the Frequency and Nature of Cancer," speaks of the alarming increase of cancer throughout the United States and more especially.in the State of New York. If for the next ten years the relative death-rates are maintained he prophesies that ten years from now we shall find that there will be more deaths in New York State from cancer than from cancer, smallpox, and typhoid fever combined. The danger of drawing false conclusions from statistics is here well illustrated, if we reflect upon the views set forth by Newsholm in the preceding paper. The latter inclines to the view that the increase in the cancer registration or mortality is only apparent, being the result of more accurate methods of diagnosis and a more perfect system of registration; and, granting the assumption of this very plausible explanation, we doubt very much whether Park's prophecy will be realized. Park represents himself as a staunch advocate of the parasitic origin of cancer, and sees nothing to prevent the closest analogies being drawn between cancer and other infectious granulomata, such as those of syphilis and tuberculosis. That the specific micro-organism has not been definitely isolated is no argument against the infectious nature of cancer, for who is there who does not regard syphilis as an infectious disease? And yet the specific organism remains to be revealed. The cachexia that is found in the pronounced stages of all the infections is but another analogy; so, too, the occurrence of cancer in certain families, its prevalence not only in certain localities, but under the same roof, and even in certain individual rooms. The characteristic reaction of the cells, the way in which they group themselves, their internal activities, their behavior in every respect, though not identical, are so plainly analogous that they cannot be disregarded. As a result of multitudinous observations histologists have noted in and among cancer cells certain appearances, that have been ascribed variously as protozoa, fungi, or cell degenerations, which provoke suspicion of the presence of micro-organisms. Before the specific organism is discovered it may be necessary to improve our technique, to devise new culture media more nearly resembling human tissué, or to supply some new staining fluid. Experimentation, especially the method of inoculation, will have to be continued under the most improved methods. Already some startling results in this line of work have been obtained, notably by Hanan, Monroe, Eiselsberg, and others, who have repeatedly succeeded in transmitting tumors from one animal to another by inoculation in implantation, and by Bosc, who alludes to three cases in which the inoculation of cancer from man to man was intentionally and successfully practised. Numerous instances could be cited of experiments, already carried out, the natural deductions of which draw the analogy of cancer to the other infectious granulomata closer. Practically all the characteristics of cancer, Park says, are explained by the well-known activity of parasites, which tend, for the most part, to an intracellular life, and which rarely penetrate the cells themselves except in search of pabulum or as the result of pressure. Finally, the contagious nature of cancer, in support of which many cases are cited, bespeaks its infectious nature. The work that is being carried on in the laboratory equipped and maintained by the State of New York, under the directorship of Park, gives promise of furnishing valuable additional information in this field of research. In virtually every fresh specimen of cancer it has been possible to demonstrate bodies which cannot be other than parasites, though whether they are fungi or sporozoa is still undetermined. Apart from the usual line of investigation, it is intended to conduct investigations, from the stand-point of physiological chemistry, of all the fluids and secretions of the body —a line of work which has been already inaugurated by Moraezewski in his estimation of the amount of chlorine and phosphorus in the blood of cancer patients.

Haviland, who has already contributed several valuable articles upon the geographical distribution of cancer, makes some more recent observations in a paper entitled "The Medical Geography of Cancer in England and Wales." In 1868 he read a paper on "The Geographical Distribution of Cancer among Females Throughout England and Wales, During the Decennial Period, 1851–1860," in which he summed up the following propositions: 1. That the districts having the highest death-rates from cancer among females were invariably associated with seasonally flooded areas traversed by or in close proximity to fully formed rivers. 2. That, geologically, these high mortality districts were characterized by alluvium and subsoils of clays of every variety, age, and formation. 3. That the districts having the lowest death-rates from cancer were situated on elevated land, where the drainage was good and the physical features of the country such as to preclude the possibility of floods; where rivers derived their sources, and where, in fact, they were not fully formed. 4. That, geologically, these two mortality districts were characterized by the oldest palæozoic rocks, especially those of the carboniferous limestone period—the liassic, oölitic, and cretaceous limestones. These observations have become enhanced in value by the fact that, though three decades have passed, Dr. Haviland has found that for the period 1881–1890 these observations still hold good. When the association between the limestones and a low mortality and between flooded clays and a high mortality is explained we may be able to throw some further light upon the etiology of cancer. To make the treatment of the subject more complete, an article from the pen of D'Arcy Power on the local distribution of cancer and cancer houses has been secured. Certain districts are described where cancer is unusually prevalent, and, not only so, but the histories are given of houses in which one or more of the families of three successive tenants developed the disease. In some instances these striking phenomena occurred in the case of a single house, in others in rows of houses under one roof. If space would have allowed it would have been interesting here to have given in detail some of the histories as they are recorded. The location of these highly infected districts was in every case in low, marshy ground, usually on the banks of a river or stream—conditions identical with those described by Haviland as prevailing in his districts of high mortality. Can any theory be formulated as to the etiology of cancer from the knowledge of its predilection for the low-lying, marshy districts? Power says it would be interesting to imagine that cancer was caused by an organism allied to and living under similar conditions to that of malaria, but differing from it in the fact that it had a much longer incubation period; that it attacked tissues in a more decadent condition; that it no longer confined itself to the blood, but that it was capable of penetrating the tissues, thereby causing a rapid proliferation of the cells — both epithelial and connective-tissue. The history of some of the cases in localities where the disease is so prevalent would lead one to suspect the water-supply or an infected house as the exciting cause; but the latter must be looked for much further afield, and it will almost certainly prove that there is some intermediate host, whose chance of detection will increase or diminish with the care which is taken to examine the fauna and flora of these particular districts.

The most interesting of this series of articles embodies the results of Plimmer's recent investigations of the etiology and histology of cancer. His time has been largely devoted to the study of the intracellular bodies, which he believes play some part in the etiology of cancer. In 1278 specimens of cancer he found these intracellular bodies in 1130 cases, and of those in which he failed to find them sixty-three were densely fibrous and atrophic, and twenty-seven were so degenerated that with careful examination no stain could be made to affect the broken-up and dead cells. These intracellular bodies are neither a part of the cell structure, nor, as has been claimed, the result of degenerative changes, since they show none of the reactions of any known degeneration; they are not found in parts of cancer undergoing degeneration, but only in the actively growing parts; they are not to be found in any other tissue, in any kind of degenerated or inflamed tissue, nor in any neoplastic tissue; they can and do multiply in cancer kept outside the body, and can be grown outside the body. They have been found so repeatedly that it has been possible to describe their morphology, their reactions to stains, their methods of division, and their location in the tissues with great accuracy. These parasites are not found in all parts of cancer, but only in the periphery, where the cells are active and not undergoing any degenerative changes; nor do they appear in equal numbers in all cases. A very decided relation between the number of parasites and the malignancy of the growth has been found, for in the rapidly growing cancers they appear to be most numerous, and *vice versa.* The exact nature of these parasites has been disputed, but Plimmer believes that in the light of our present knowledge they should be called protozoa. The Italian school, headed by Sanfelice, regard them as blastomycetes, but it is possible that these are only protozoa in their developmental stages.

However we may choose to classify these parasitic bodies, the fact remains that they are constantly present in all cases of cancer; that they are constantly absent in other diseased conditions of the cell; that by improved technique in fixing and staining the tissues it has become possible to study their life-history with great accuracy. The value of these histological studies has been enhanced by the results of experimentation in the isolation and cultivation of these bodies outside the human body and the inoculation of animals with these organisms. Plimmer has succeeded in isolating an organism from a malignant tumor in man which, when introduced into animals, has caused death, with the production of tumors, so far, of endothelial origin. (That these tumors have been of endothelial origin is due to the fact that it has been difficult to bring the tumor into contact with a likely epithelial surface in a suitable animal.) Pure cultures made from these tumors will, if inoculated into suitable animals, reproduce similar growths.

Since in recent years surgeons recognize the necessity of removing not only the growth itself, but the tissues through which the lymphatic vessels run, and the neighboring lymphatic glands, the percentage of cures on the three-year limit is daily growing larger. In cancer of the breast the recent series of sixty-one cases operated upon by Watson Cheyne yielded him a percentage of 50 per cent. cures as compared with the former percentage of 10 per cent. when the incomplete operation was performed. Cheyne removes the entire breast, with all its ramifications, all the pectoral fascia, and the pectoral origin of the pectoralis major, if necessary; all the tissue lying between the breast and axilla, and all the axillary contents with the exception of the vessels and nerves. In order to insure removal of all the breast lobules the skin is undermined as far as the clavicle above, the middle of the sternum internally, over the abdominal muscles below, and the latissimus dorsi to the outer side. Operative interference in cancer of the skin yields more permanent results than in any other form of cancer, providing one allows sufficiently free margin of healthy skin around the growth. The lymphatic vessels are rarely themselves involved, and the lymphatic glands remain free from infection for a considerable time. In epithelioma of the extremities where amputation was performed there were 51 per cent. of cures, and the recurrences, which were eventually glandular and not local, were 35 per cent. The number of cures following extirpation of epithelioma of the lower lip is over 40 per cent. Bearing in mind the mode of spread of cancer along the lymphatic area, better results should be obtained if more material were removed in that direction by prolonging the apex of the wedge downward. At the time of the primary operation, or as soon as there is the slightest evidence of glandular involvement, the submaxillary and submental regions should be exposed and dissected free of all lymphatic glands and overlying fat. Cancer of the tongue should be regarded as the worst form of cancer the surgeon has to deal with. By taking every precaution against sepsis the mortality cannot be reduced below 5 to 10 per cent., and recurrence is apt to be rapid. Cheyne makes it a practice to clear out the submaxillary and anterior triangles in all cases; if the glandular involvement is slight or absent at the time, the tongue is removed first, and the triangles approached a week later, but when there is marked glandular involvement and where the seat of the disease is not very extensive, he clears out the triangles first, and a week later removes the tongue. But little advance has been made in the technique in operations for cancer of the throat, and unless the disease be very limited there is but little hope of obtaining radical cure. The risks of the operation are very great, more especially from septic pneumonia. Cancer of the larynx is much more amenable to treatment, and since such advances have been made in laryngoscopy the disease is detected in its earliest stages, when it is limited to but one vocal cord and its vicinity, and before there has been any lymphatic involvement. If a complete laryngotomy is indicated much better results have been obtained of late by abandoning the idea of providing for the insertion of an artificial larynx. When this was done the dangers of septic pneumonia increased the risks of the operation. Surgery offers no hope of a radical cure for cancer of the œsophagus; the best it can do is only palliative, and may prolong the patient's life, which is threatened by starvation, for a short period.

Cancer of the body of the stomach has of late been treated by complete extirpation of the organ, but the cases in which this operation is justified must be extremely rare. Either the vitality of the patient will not admit of such a formidable operation or the extent of the disease makes it impracticable. When cancer is limited to the pylorus operative interference has yielded excellent results, but as in cancer elsewhere the operation, to be successful, either as regards life or freedom from recurrence, must be done early. When pylorectomy is contraindicated the patient can be relieved of a great deal of suffering by effecting an anastomosis between the stomach and jejunum. Malignant disease of the rectum is now most accessible to the knife, and in suitable cases the radical operation should be recommended, since we know that in no mean percentage of cases there is no recurrence, and, if the disease does recur, it does so with extreme slowness. The suitable cases may be said to be those which are in the early stage, those where the bowel is freely movable and not adherent to the surrounding organs or sacrum, and those where the cancer is within fairly easy reach of the finger.

Of all the methods that have been suggested in the treatment of inoperable cancer but one has had sufficient trial to warrant its recognition. The mixed toxins of erysipelas and bacillus prodigiosus have been employed by Coley himself in 148 cases and by other observers in thirty-five cases. Of the 148 cases the treatment may be regarded as primarily successful in twenty-four, or 15 per cent., and of the series of thirty-five cases twenty-six disappeared completely, two others decreased so much that only an insignificant node was left. These results are sufficient to warrant this form of treatment being pursued in the strictly inoperable cases. Unfortunately but little success has been obtained in its application to cancer proper, the best results being reported in cases of spindle-cell sarcoma. The toxins have been used for a short time after operation, with some promise of success, as a prophylactic measure. The treatment at least rests on a logical and scientific basis, and inasmuch as so many authentic cases have already been recorded in which there has been no recurrence in three years, it cannot be ignored by the profession.

REVIEWS.

A Practical Treatise on Fractures and Dislocations. By Lewis A. Stimson, B.A., M.D., Professor of Surgery in Cornell University Medical College, N. Y., etc. With 362 illustrations and plates in monotint New York and Philadelphia: Lea Brothers & Co., 1899.

This new edition of the author's well-known works on the above subjects has, as he states in his preface, been practically re-written.

It has been brought well up to the present day in its teachings, and in the main constitutes a most excellent guide for the general practitioner in the management of the important classes of surgical cases with which it deals. A judicious conservatism characterizes most of the recommendations of the author, with whom, however, the reviewer cannot in every instance agree. For example, the treatment of fractures into or near the elbow-joint seems altogether incomplete without a full discussion and description of the method recommended by Mr. Jones, of Liverpool, which has now amply demonstrated its practical value. Professor Stimson says, writing of fractures of the lower end of the humerus: "The tendency to displacement except by the unsupported or improperly supported weight of the limb is so slight that if reduction can be made a satisfactory result should be obtained in most cases, the exceptions being those in which the functions of the joint are diminished by obstructive callus or by periarticular thickening. Consequently every effort should be made to effect a complete reduction, especially when the fracture extends into the joint, even, if necessary, by exposure through an incision, and then to prevent its recurrence by so supporting the limb that this cause of displacement may not become operative."

It is just this diminution of the functions of the joint which the "Jones method" was designed to prevent; it is certainly far more easy of employment than the "splint, preferably of plaster-of-Paris, extending along the posterior aspect from the wrist to the shoulder," recommended by the author. It is also more comfortable to the patient, and, more important still, the functional results obtained compare favorably with those following any other method of treatment. The suggestion of "exposure through incision" might perhaps have been still more carefully guarded, so as not to offer too much encouragement to operation by inexperienced surgeons.

An important point as to which there is room for difference of opinion relates to the influence of the presence of foreign bodies on the fragments in cases of non-union. Most surgeons would agree with the author when he says, p. 97, "Another fact to which I think far too little attention has been given, but of which I have been convinced by many observations, is that the presence of a foreign body, even if sterile and unconnected with suppuration, in bone at or near the line of fracture, notably exaggerates and prolongs the preliminary rarefaction of the bone. I believe this influence may even cause failure of union by transformation of a considerable portion of the bone into fibrous tissue, for in several cases in which I have operated for failure of union several weeks or months after a wire suture has been applied to the fracture I have found the suture lying free and the ends of the fragments thinned and pointed and separated by a considerable intermediate mass of fibrous tissue. That the holes pierced for such sutures enlarge, and that the bone included in the loop wholly disappears, is a common observation, and I believe the same change is promoted for a considerable distance round about; and although this ill-effect is not to be expected always to follow, yet its possibility should be seriously considered."

But when he applies this line of reasoning to the treatment of ununited fracture he seems to ignore too completely the need that often exists for excessive and long-continued stimulation of the fragments—even after resection and accurate apposition—to secure reparative material in proper quantity and quality. He says, p. 112: "The surgeon may freely expose the fracture by incision, resect the ends of the fragments, bring them into close and exact apposition, and secure them there by external dressing with or without the aid of a suture or other fastening applied directly to the bone. In the preceding chapter I have given reasons for thinking that the presence of a permanent metallic suture or pin interferes with the processes by which alone union can be accomplished, and I must repeat my belief that sufficient security can be given by an external dressing, and that the usefulness of a suture is limited to keeping the fragments in position during the application of that dressing." This is often true, but the exceptions constitute the most difficult cases of non-union that the surgeon has to deal with, and should be emphasized, not ignored.

The suggested change in classification of the fractures of the skull is in the direction of simplicity, which cannot be said of some of the other classifications—*e. g.*, that for luxations of the elbow. But all such systematizing is open to criticism, and may be regarded as too complex for clearness or too simple for accuracy, according to the stand-point of the critic. The skiagraphs, especially those relating to Colles's fracture, add much to the value of the book; but many surgeons will agree with the remarks of the author in the preface. He says: "In studying these photographs it must be remembered that they are the reproductions of shadows, not, like ordinary photographs, of the appearance of illuminated surfaces, and that the apparent modelling of the bones is inexact because it is due to differences in thickness and opacity to the rays. While the X-rays have been of interest and value in showing details of certain fractures, especially at the wrist, elbow, and ankle, yet it cannot fairly be said that they have yielded much information of practical value which could not have been obtained by palpation. Probably their usefulness will be increased by improvements in methods and apparatus, but at present the information which they give needs to be sifted with great care from among many misleading appearances."

It is also probable that the profession would support him in his views as to the "ambulatory treatment" of fractures in the lower extremity. He truthfully says: "The method exposes to risks of displacement and of healing with deformity, which, in my judgment, outweigh even the claimed advantages, and the statistics show that the risk is a real one and that the damage results in a considerable proportion of cases."

His method of treatment of recent fracture of the patella is well known, but has not, we believe, come into general use. It is apropos of this that he makes the remarks quoted above from page 97.

It is to be regretted that in so excellent a book the index is altogether insufficient, and is liable to lead a reader or reviewer to suspect omissions that do not exist.
J. W. W.

THE PRINCIPLES AND PRACTICE OF MEDICINE. By WILLIAM OSLER, M.D. Third edition, entirely revised and enlarged. New York: D. Appleton & Co., 1898.

THE fact that this is a new edition is evident on nearly every page. The most massive alteration is in the classification of nervous diseases, the system diseases being now arranged in consonance with the neuron theory, and, with a description of this theory, occupy the first place in the chapters on nervous affections. Changes which are less extensive, though of equal importance in their practical relations, are seen throughout, and most notably in the descriptions of the infectious diseases. In the latter class we now meet rheumatic fever and lobar pneumonia; the first of these has been almost conclusively proven to be an infectious disease; the latter is of course well established as such, and its symptoms are so largely due to the toxæmia that its transference from the class of pulmonary affections to that of specific infectious diseases is more than warranted. Among the infectious diseases of doubtful nature, glandular fever receives a description. Many thoughtful men still have much skepticism as to the existence of such a disease, and it would perhaps have been more just if this skepticism had been recognized.

Under minor headings very important changes and additions may be seen, such as a complete acknowledgment of the specificity of the meningococcus in the causation of cerebro-spinal fever; and in discussing typhoid fever the addition to the description of the modes of infection of a succinct statement of the convincing proof that has been brought forward in recent years, that this disease is an infection of the whole organism, while the intestinal lesions are but the usual local results, an amount of proof so damning to the antiseptic fanaticism whose priests think to purge their consciences vicariously, through the bowels of the patient, and to put the bacilli to flight by means of almost continuous volleys of antiseptic pellets. In all portions the discussion of infectious diseases is entirely abreast of the times, and, indeed, without further discussion of details, the same may be said of the entire work. The profession has become so well acquainted with the details of the previous editions that it will be prepared for the evidence of acquaintance with the work of others, the results of personal investigation of new facts and theories, and the masterly arrangement of material that are to be seen in this edition. In a very few instances the additions are unsatisfactory; the articles on hypertrophic stenosis of the pylorus and dilatation of the colon, for instance, consist entirely of reference to some interesting literature on these questions, but wholly omit any discussion of the clinical pictures presented by these diseases.

In the question of treatment there is in this edition an evident change. Of the earlier edition it might justly be said that a practitioner who turned to this book for aid in the management of his cases could not acquire a wide range of resources, and would be likely to become skeptical of the value of drugs. The present edition gives more space to therapeutic measures, and a larger number of resources are offered.

In a more general consideration of the work an impression is conveyed that close familiarity with important scientific problems of the time leads the author unconsciously to treat these questions in a manner that, to imperfectly instructed readers, or those of lower intelligence, at times seems obscure; technicalities are disheartening to such a class, and it is to be wished that greater simplicity had been used in some parts, offensive as the latter is to many well-trained readers. And, too, large numbers of references to names are of doubtful value, and often confusing, and had his generous desire to recognize the work of others allowed Dr. Osler more frequently to stamp his references with the impress of his authoritative judgment, more positive and satisfactory impressions would have been conveyed in some instances.

Such criticisms are, however, minor matters, and do not alter the fact that the book has probably but one modern rival. D. L. E.

A TEXT-BOOK OF PRACTICAL THERAPEUTICS. By HOBART AMORY HARE, M.D., B.Sc.; Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia; Physician to the Jefferson Medical College Hospital, etc. Seventh edition, enlarged, thoroughly revised, and largely rewritten. Pp. xv, 776. Philadelphia and New York: Lea Brothers & Co.. 1898.

A TEXT-BOOK OF MATERIA MEDICA, THERAPEUTICS, AND PHARMACOLOGY. By GEORGE FRANK BUTLER, Ph.G., M.D.; Professor of Materia Medica and Clinical Medicine in the College of Physicians and Surgeons, Medical Department of the University of Illinois; Professor of General Medicine and Diseases of the Digestive System, Chicago Clinical School; Attending Physician to Cook County Hospital, etc. Second edition, revised. Pp. xv, 860. Philadelphia: W. B. Saunders, 1898.

THE American physician is resourceful; the list of remedial agents is a long one, because of the extent of territory giving rise to local differences of teaching and practice and the survival of the traditions born of empiricism. Therapeutic nihilism has been observed as sporadic outbreaks, but has never been endemic. Medical unbelief has awakened interest in its assumption, but the dissatisfaction which it has aroused in the patient has usually led to its speedy abandonment. The interrogation point of the physician becomes a zero in the mind of the patient, and skepticism is classed as a variety of ignorance. A scientific therapeutist enjoys higher rank than the most accomplished diagnostician, and rightly so, for to him turn all who wish not merely a name but a remedy for disease. To therapeutics in general all specialties are indebted for their strongest claims for the attention of the public. General and most of special surgery, considered apart from two important therapeutic contributions—anæsthesia and antisepsis—remains but a branch of mechanics. That the practice of the healing art shall be productive of its best possible results, the properties of remedies must be thoroughly studied as a matter of medical knowledge, and trained observation exercised in their application. An exact knowledge of both physiology and pathology is essential, that therapeutic possibilities may be accurately determined; a close attention to details and a judicial mental poise are necessary for a sound judgment and that the best results may be obtained. However much the present may have improved the pathology and diagnosis of disease as compared with a past medical generation, the fact remains that our grandfathers did not lack for means with which to combat disease; nor has the legacy of bygone empiricism been by any means valueless. That the use of a remedy passes from the empirical to a rational stand-point as chemistry, physiology, and pathology throw new light upon its pharmacology the history of any remedy whose use has extended over a century—notably digitalis leaves and cinchona bark—will readily demonstrate. The trend of therapeutics of to-day is toward the establishment of a reasonable theory for the use of approved remedies and the investigation of new agents for the purpose of determining their value. If the use of some remedies still remains empirical, it is quite as likely that the pathology of the disease is obscure or erroneously taught as that the physiological action of the agent is incompletely known. Since the securing of the best results by the safest, quickest, and most pleasant means is that to which the efforts of the physician are directed and upon which his reputation depends, it is of the highest importance that his teaching should be thorough, systematic, broad, and fully abreast of the times. He should be graduated prepared to develop his experience upon his theory well learned. He should then become thoroughly conversant with the materials (materia medica), so that he may intelligently apply them in the treatment of disease (therapeutics).

Professor Hare, in his seventh edition, has inserted ten illustrations, re-written many sections, and increased his number of pages by eighteen. For the student the alphabetical arrangement of remedies, the failure to adhere to pharmacopœial nomenclature. and the brief materia medica, seem inadvisable. The therapeutic information, even if not presented in the most assimilable form, shows wide reading, considerable personal investigation, and an extensive clinical experience. For the practitioner who wishes to know modern treatment, including the latest remedies, but not those as yet of undetermined value, this volume will be useful. The popularity of the book is deserved, and this edition maintains the high standard of its predecessors.

Professor Butler presents a second edition, very closely following the first, even in its paging. The most important change is the substitution of a chapter on the untoward effects of drugs, including an excellent table, for that on definitions. After devoting one hundred and thirty pages

to pharmaceutical preparations and questions bearing upon pharmacology and therapeutics, an attempt is made to classify remedies as (1) disease and (2) symptom medicines, each subdivided into groups, mainly according to their use. This is of decided advantage to the student; for even if the sum total of his knowledge may be less than if derived from other books, yet it will likely be more readily utilizable in that it has been studied in connection with and in relation to facts of similar bearing. Each remedy is logically and painstakingly presented and its therapeutic uses fully described. A considerable amount of information of secondary value occasionally obscures the more important, but this is pardonable when a system is so closely adhered to. Many remedies of very recent use are mentioned as likely to prove to be useful, but which have not the approbation of the author based upon personal experience. The physician may prefer that some one else experiment with them; the student needs more warning than size of type would imply. While we have studied this edition we can but feel that the present should have shown a greater advance over its predecessor; especially the name of the author from whom he adopts his classification of remedies (as given in footnote on page 26) should be corrected.
R. W. W.

DISEASES OF THE SKIN: AN OUTLINE OF THE PRINCIPLES AND PRACTICE OF DERMATOLOGY. By MALCOLM MORRIS, Surgeon to the Skin Department, St. Mary's Hospital, London, etc. With 10 colored plates and 26 engravings. New and revised edition. Philadelphia and New York: Lea Brothers & Co., 1899.

THIS new edition of Mr. Malcolm Morris's treatise upon diseases of the skin shows evidence of careful and judicious revision, additions, and alterations being found in every chapter and upon almost every page. New plates and additional woodcuts have been introduced, which are, for the most part, material aids to the clear understanding of the text. We regret that the author has not taken advantage of the opportunity afforded by the preparation of a new edition to alter somewhat the arrangement of the various diseases considered. While no formal system of classification is followed, the several diseases are grouped according to their "etiological affinities." We grant at once that an etiological classification would be an ideal one if our knowledge of the causes of cutaneous maladies was in a less chaotic state; but, in view of the very small number of diseases in which the cause has been definitely determined, such a classification rests upon an exceedingly slender foundation. We must confess our inability to see upon what ground such affections as erythema solare, erythema pernio, and lupus erythematosus, not to mention other examples, are included among neurotic diseases of the skin. We cannot but believe that some other arrangement more in accord with the generally accepted ideas of cutaneous pathology and etiology could have been advantageously substituted for the present one.

The author is apparently more inclined than formerly to believe, with Unna, in the parasitic origin of eczema, since he no longer declares his inability to follow this writer in regarding all eczemas as parasitic;

and the success of treatment based upon this theory is looked upon as a strong argument in its favor. As an example of the sound common sense dominating the book we must refer to the caution against over-treatment of this protean malady, a masterly inactivity being the best policy when the disease is quiescent or in retrogression.

In the treatment of lupus vulgaris the old tuberculin is still regarded as having a distinct place, along with topical remedies. The new tuberculin has been tried and found disappointing, although the results at first were brilliant.

In the chapter on ringworm the results of the author's own observation and research are succinctly stated. He is of the opinion that there are but two varieties of the ringworm fungus of clinical importance, a small-spored fungus, the *microsporon audouni*, which attacks the scalp chiefly and is found almost exclusively in children, and a large-spored one, found upon the body, in the beard, and the nails. His observations also lead him to believe that many forms of tinea tonsurans are varieties of favus.

In concluding we take pleasure in recommending this treatise to those who desire a reliable guide in dermatological practice.

M. B. H.

THE AMERICAN TEXT-BOOK OF GYNECOLOGY, MEDICAL AND SURGICAL, FOR PRACTITIONERS AND STUDENTS. By HENRY T. BYFORD, M.D.; EDWIN B. CRAGIN, M.D.; WILLIAM GOODELL, M.D., FLORIAN KRUG, M.D.; WILLIAM R. PRYOR, M.D.; J. M. BALDY, M.D.; J. H. ETHRIDGE, M.D.; HOWARD A. KELLY, M.D.; E. E. MONTGOMERY, M.D.; GEORGE W TUTTLE, M.D. Philadelphia: W. B. Saunders, 1898.

THE rapid and progressive advances in the science and art of gynecology during the last few years have created an almost constant necessity for the revision of works on this subject. For this reason the writers of this book, all of whom are prominent teachers of this branch of surgery, offer to the profession a second and revised edition, adding such new material and modifying or eliminating the old as subsequent experience and practice would seem to justify. A large number—more than forty—of the old illustrations have been replaced by new, original, and borrowed illustrations, all of which add very materially to the elucidation of the text, and, very wisely, they picture methods, not specimens.

The descriptions of the preparations for each operation and the after-management of patients have been relegated to the chapters on technique and after-treatment; this has relieved the body of the book from continual repetition.

The chapters on laceration of the soft parts have been generally improved, particularly as to illustrations, which are taken from the *Text-book on Diseases of Women*, by Prof. Penrose. We would note that while a rather new secondary operation for complete tear of the perineum is described, Figures 143 and 144 illustrate the Emmet operation, which latter operation, though generally accepted as the best, is not mentioned. In the chapter on distortions and malpositions, the epithelium of the endometrium is referred to as melting off during menstruation, and in pathological anteflexion as coming away in blocks and threads. Recent histological investigations, we believe, have very definitely proven that no desquamative changes in the endometrium take place during this physiological process. This is also referred to in the chapter on menstruation and its anomalies.

We are surprised to see advised the extensive use of the uterine sound and uterine elevator in describing methods of examination of the female pelvic organs; for we believe these instruments, except during operation, have long since been dropped from the armamentarium of the modern gynecologist, and are considered to be very dangerous.

It would seem also that the pathology of the female genital tract in this book, both macroscopical and microscopical, needs more complete revision and elaboration.

The chapter on the bladder, urethra, and ureters have been re-written and brought thoroughly up to date. Hysterectomy also, both abdominal and vaginal, has been revised and modified and beautifully illustrated. With few exceptions, however, and considering that difference of opinion will always exist, this book is generally to be commended as one of the most complete and practical works on gynecology. It is a clearly written, up-to-date, and safe, practical guide in the treatment of the diseases of women, and well deserves the popularity it has already gained. H. D. B.

ATLAS AND EPITOME OF OPERATIVE SURGERY. By DR. OTTO ZUCKERKANDL, Privat-docent in the University of Vienna. Authorized translation from the German. Edited by J. CHALMERS DA COSTA, M.D., Clinical Professor of Surgery in Jefferson Medical College, Philadelphia; Surgeon to the Philadelphia Hospital, etc. With twenty-four colored plates and 217 illustrations in the text. Pp. 385. Philadelphia: W. B. Saunders, 1898.

THIS work is a translation of one of the series of Lehmann's *Medicinische Handatlanten*, which have of late become quite popular. It is designed as an elementary work for students in operative surgery, and is one of the best of its kind.

The various "typical" operations are succinctly and carefully described, due reference being made to the surgical anatomy of the parts. A judicious selection from the numerous operative procedures has been made, and the book is thoroughly up to date. The abundant illustrations are, taken as a whole, good, though a few inaccuracies have crept in, as, for instance, the position of the arteria profunda femoris in Plate IX; the high position of the innominate artery in Plate XIV; and the absence of several veins in Plate XI.

In the description of intestinal sutures the importance of including part of the submucosa in the Lembert stitch, so strongly insisted upon by Halsted, is not alluded to.

A few inaccuracies of nomenclature, as "deep perineal nerve," on page 82, and "choledoch duct," on page 320, may be noted. However, it were captious to allude to these minor defects in a work of such general excellence. C. A. H.

ELEMENTS OF HISTOLOGY. By E. KLEIN, M.D., F.R.S., Lecturer on General Anatomy and Physiology; and J. S. EDKINS, M.A., M.B., Joint Lecturer and Demonstrator of Physiology in the Medical School of St. Bartholomew's Hospital. With 296 illustrations, revised and enlarged edition. Philadelphia and New York: Lea Brothers and Co.

THE new edition of Prof. Klein's popular *Histology* shows some marked improvements on previous editions. New illustrations have been added, the text has been enlarged, and the chapters on the Central Nervous System and on the Alimentary Canal have been rewritten. As in previous editions, no attempt has been made to furnish a laboratory manual, and all directions for the preparation and examination of tissues are dispensed with. The subject of histogenesis is not extensively considered. The book is, therefore, purely descriptive and can be relied upon to give in a small compass a large amount of trustworthy information, clearly put and easily understood and attained. Students who have mastered this little volume may present themselves with little fear at their theoretical examination in histology, and there are few books which we would so heartily indorse.

The text is materially elucidated by the many excellent illustrations. The micro-photographs, which are scattered quite abundantly throughout the work, share in the common objection to this class of illustrations, in that they are often more confusing than helpful, and could have been largely replaced by good drawings with considerable advantage.

There is a pleasing absence of a defect only too common in textbooks, viz., one-sidedness, either in the space allotted to the subjects or in the thoroughness and fairness in their treatment.

If it were permissible to select any one part better than the others, we should fix upon the chapter on the Central Nervous System, which, with the help of many excellent illustrations, is, perhaps, more clearly and comprehensively treated than in many other small general textbooks of histology. The authors deserve especial compliments upon this portion of their book. C. A. H.

ATLAS OF SYPHILIS AND THE VENEREAL DISEASES, INCLUDING A BRIEF TREATISE ON THE PATHOLOGY AND TREATMENT. By PROF. DR. FRANZ MRACEK, of Vienna. Authorized translation from the German. Edited by L. BOLTON BANGS, M.D., Consulting Surgeon to St. Luke's Hospital and the City Hospital, New York; Late Professor of Genito-urinary, Surgery and Venereal Diseases, New York Post-Graduate Medical School and Hospital. With seventy-one colored plates. Philadelphia: W. B. Saunders, 1898.

THIS *Atlas* contains in a compact form illustrations of the principal venereal lesions. The selection of subjects has been judiciously made, the typical and more common pathological conditions having been chosen, and the plates representing them are excellent. A concise description and brief clinical history of a case are given in every instance. There are 117 pages of text, interspersed with numerous formulæ. C. A. H.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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The Operative Treatment of Typhoid Perforation of the Intestines.—According to PLATT (*The Lancet*, February 25, 1899, p. 505), the operative treatment of typhoid perforation was first suggested by Leyden in 1884, and first carried out by Lücke in 1885. Since then the published cases have been collected by various observers. In January, 1898, Keen collected eighty-three cases, with sixteen recoveries. Platt reports three cases of his own, with one recovery. His three cases, with seventeen others collected from the literature, added to Keen's series, make a total of 103 operations with twenty-one recoveries.

The advantage of early operation is well illustrated by the following statistics: Of seventeen cases operated on within twelve hours, four, or 23.5 per cent., recovered; of twenty-six cases operated on between twelve and twenty-four hours, nine, or 34.6 per cent., recovered; of fourteen cases operated on between twenty-four and forty-eight hours, one, or 7.1 per cent., recovered; of six cases operated on between two and three days, six, or 33.3 per cent., recovered; of four cases operated on between three and four days, none recovered; of one case operated on after five days, none recovered; of one case operated on after thirty-five days, none recovered.

Platt advises deferring the operation until the primary shock, which usually accompanies perforation and which, as a rule, lasts for a few hours, has somewhat passed off. The best results have been obtained in cases operated on after an interval of from twelve to twenty-four hours, although no surgeon would think of waiting for twelve hours, provided that other circumstances were favorable. Platt's is the third successful case that has been reported in England out of a total of thirteen published operations.

The Medical Treatment of Typhoid Fever.—STEWART (*The Montreal Medical Journal*, February, 1899) first refers briefly to the work that has been done on the immunizing and curative treatment of typhoid by means of serum-therapy. The subject is dismissed with the statement that, although it has apparently been effective in the disease as it is met with in susceptible animals, still it has been disappointing when applied to counteract the disease in the human subject.

The eliminative and antiseptic treatments advocated by Thistle and Woodbridge, respectively, receive severe criticism. Regarding the latter treatment, he says that, as the typhoid bacilli are not present in the intestinal tract prior to the breaking down of the lymph-tissue, it is impossible for antiseptics to reach them except through the blood, and it is, of course, vain to expect that any medicinal agent that we know of can exert a germicidal action on the organism collected in the lymph-tissues.

The antipyretic treatment is next dealt with. Of medicinal agents, antipyrine, phenacetin, and lactophenine are the ones now most frequently employed. Their use is discouraged, however. The cold-bath treatment of Brand is generally conceded to be the best. The statistics are universally favorable from all parts of the world. The mortality at the Red Cross Hospital at Lyons amounted to 7.3 per cent.; that of Hare, in the Brisbane Hospital in Queensland, 7.84 per cent.; that at the German Hospital in Philadelphia, under Wilson and his colleagues, to 7.8 per cent.; that of Osler, in Johns Hopkins Hospital, to 7.8 per cent. According to J. C. Wilson, these statistics show that the Brand method, systematically carried out and applied to successive cases as they present themselves, is the means of saving, out of every hundred cases of the great endemic disease, at least seven more lives than by any other method.

The results obtained at the Royal Victoria Hospital in Montreal have been even more gratifying. Since its opening in January, 1894, 408 cases of typhoid fever have been treated. Only eighteen, or 4.4 per cent., were fatal. In nine, or exactly one-half of these fatal cases, death was caused by perforation and hemorrhage. Stewart states that the percentage of deaths due to perforation and hemorrhage is considerably greater with the Brand than with other forms of treatment.

There is no evidence to show that relapses are commoner with the bath treatment than with other methods. In a large series of cases relapses occur in from 3 to 12 per cent. In 325 of the 408 cases in which special pains were taken to study this point, relapses occurred in about 8 per cent. This percentage corresponds exactly with Osler's and Liebermeister's series, and is not larger than that given by observers in different countries where other plans of treatment are followed.

Next to perforation, intestinal hemorrhage is the commonest cause of death. Hemorrhage was the cause of death in three of Stewart's fatal cases. It is best treated by partial or complete restriction of nourishment by the mouth, application of a Leiter's coil over the abdomen, and elevation of the foot of the bed. Opium should be given in sufficient quantity to cause either slight drowsiness or contraction of the pupil.

Perforation was the cause of death in six of the eighteen fatal cases. Stewart says that the sooner the case is transferred to the surgeon after perforation occurs the better. The results of operation have been very encouraging. Keen has collected eighty-three cases, with eighteen recoveries.

Stewart appears to favor a milk or liquid diet, but refers to the more liberal dietary advocated by Barr, of Liverpool, and Shattuck, of Boston, both of whom have apparently obtained satisfactory results.

Chloride Metabolism in Pneumonia and Acute Fevers.—HUTCHISON (*The Journal of Pathology and Bacteriology*, 1898, vol. v. p. 406) has made a careful clinical and pathological study of chloride metabolism in pneumonia and acute fevers. There is an exhaustive review of the literature, to which are added the results of the writer's personal work.

The following is the author's summary of clinical facts:

1. During an attack of croupous pneumonia the chlorides in the urine are greatly diminished or may even entirely disappear.
2. A comparison of the intake and output shows a true retention of chlorides within the body. The amount retained averages about 2 grammes of sodium chloride for each day of the disease.
3. The diminution lasts usually for one or two days after the crisis, and is succeeded by a sudden and excessive secretion, the amount of chlorides in the urine now rising considerably above that in the food.
4. The degree of the diminution varies considerably in different cases, but bears no relation to the degree of fever present, to the extent of lung involved, or to the presence or absence of albuminuria.
5. The chlorides are the only constituent of the urine which is diminished in pneumonia; the phosphates and sulphates tend, like the urea, to be increased.
6. Diminution of chlorides is not pathognomonic of pneumonia, but may occur in other acute fevers, notably in typhus and acute rheumatism, but is more constant in croupous pneumonia than in any other febrile disease. In cases of malaria the chlorides are actually increased during the febrile period.
7. As croupous pneumonia is the only pulmonary disease in which diminution of chlorides occurs to any appreciable extent, an examination of the urine may prove of great value in the diagnosis of pneumonia from other causes of consolidation of the lung, and from empyema, pleurisy, etc. It must be borne in mind that the chlorides may be markedly diminished in some cases of disease of the stomach, notably in dilatation.
8. The degree to which the chlorides are diminished is no criterion of the severity of the disease in any particular case, and is of no help in forming a prognosis.

Hutchison summarizes the pathological facts as follows:

1. The absorption of the chlorides from the alimentary tract goes on normally in acute fevers, and no vicarious excretion occurs by the skin, bowel, sputum, or other channels.
2. The sputum in pneumonia is very rich in sodium chloride, containing sometimes as much as 19 per cent. in the solid matter; but in spite of this fact the total amount excreted daily in the sputum is small.
3. The inflammatory exudate contains from 2 to 4 per cent. of sodium

chloride in its solid matter, or not more than three times as much as the same weight of normal lung. It is thus not really very rich in chlorides, and the amount of the latter contained in the whole exudate will not account for more than one-third to one-half of the total amount of sodium chloride retained in the body during an attack of pneumonia.

4. The difference in composition between the exudate and the sputum indicates that the latter is not derived directly from the former.

5. The theory that the chlorides are retained because of a temporary functional disability on the part of the kidney to excrete them is negatived alike by the results of experiments and by a comparison of the composition of the urine of pneumonia with that of acute nephritis where diminution of excretory powers undoubtedly exists.

6. Examination of the blood from cases of pneumonia shows that the chlorides in it are diminished, but there is no evidence that they are present in any unusual form of combination. Their failure to appear in the urine must be attributed to the very delicate adjustment of the amount excreted by the kidney to the amount contained in the blood at the time.

7. There is no evidence that the chlorides tend to accumulate in any particular organ in pneumonia, but, on the other hand, all the organs, and the fixed tissues in general, seem to be somewhat richer in chlorides than normally.

8. Attempts to produce chloride retention in pyrexia artificially induced by the injection of the pneumococcus and by other means have failed.

9. As to the reason for the passage of chlorides out of the blood into the fixed tissues in pneumonia, one can merely speculate. Hutchison is unable to agree with the view that the chlorides are retained secondarily and as the result of the retention of a considerable quantity of water. The increased excretion of chlorides in malaria is probably to be attributed to increased arterial tension in the kidney during the pyrexial stage of that disease.

Glutoid Capsules in Diagnosis.—SAHLI (*Deutsches Archiv f. klin. Med.*, Band lxi., Heft 5 and 6) calls attention to the diagnostic and therapeutic importance of the glutoid capsules made under his direction and first made known more than two years ago. The so-called glutoid is gelatin hardened in formadehyde. It resists water and peptic digestion, but is readily dissolved in pancreatic digestion. The makers have found it possible to prepare the capsules in different grades of hardness or resistance to tryptic digestion, so that the individual capsules vary not more than three-tenths of a degree (one degree equals an hour) either way from the time indicated. As indicators, iodoform and salol were found most useful, the saliva being tested for iodine in the former case, the urine for iodine and salicylic acid in the latter, or both reagents were used in one or two capsules. A large number of experiments are reported in abstract, showing the diagnostic value of the method. This was very striking in cases of cancer of the pancreas with obstruction of the duct, and in one of these the demonstrated absence of pancreatic digestion was the only sign of involvement of the pancreas. The importance of the method is evident in cases of jaundice in which the pancreas may be concerned, but here the results must be used with caution, for in one of Sahli's cases with jaundice and pancreatic digestion autopsy revealed a small cancer of the head of the pancreas, compressing the common bile duct, but not the pancreatic duct. It is essential that the motility of the stomach is not impaired. In normal cases a capsule with a hardness of 2.9 gives the reaction within four hours. The "normal" dose of iodoform used was 0.15 gramme, and Sahli came to the conclusion that this was best given in three capsules of 0.05 gramme each. For children one or two capsules were used. The saliva is more readily tested than the urine, and gives the reaction usually in a shorter time. As the author remarks, many details must be worked out, but the value of the method in the study of intestinal and pancreatic digestion is obvious.

Disease of the Nervous System in Leukæmia.—EICHHORST (*Deutsches Archiv f. klin. Med.*, Band lxi. p. 519) has had occasion to look up the literature of this subject, and gives a brief *résumé* of the cases hitherto reported. Though the cases are few they show that various parts of the nervous system have been found involved in leukæmia, and in various ways, so that hemorrhages, small-celled infiltration, swelling of nerve-fibres, atrophy of nerve-fibres, and compression by lymphoid growths, have all been noted. The author's own case is interesting. A boy, aged seventeen years, had enormous enlargement of the axillary, infraclavicular and cervical lymphatic glands, with slight enlargement of the spleen and liver. There were 3,600,000 red corpuscles and 41,650 leucocytes per c.mm. Differential count of the latter showed 79 per cent. polynuclear, 16 per cent. mononuclear, and 5 per cent. eosinophiles, largely polynuclear; no nucleated reds. The patient was treated with lymph-gland tablets, arsenic, gray ointment, and anti-streptococcus serum in turn without benefit. Symptoms of compression of the spinal cord developed; the red corpuscles fell to 3,300,000; the leucocytes rose to 45,000. The axillary lymph-glands broke down; decubitus, diarrhœa, and collapse ended the scene. As a cause of the compression a mass of lymphoid tissue was found in the peri-dural fat, at the level of the fifth to the seventh dorsal vertebræ, pressing on the posterior surface of the cord, which was softened at that point. The enlarged glands were necrotic, but revealed no tubercle bacilli.

The report illustrates the difficulty of separating leukæmia from certain cases of sarcoma. The descriptions of the blood as detailed would not lead any one to suspect leukæmia, especially the lymphatic form, as the author calls this, and even the high ratio of uric-acid to urea seems insufficient to corroborate his views, inasmuch as both were decreased. The meagre description of the blood and the general confusion of the protocol are much to be regretted in view of the great importance of such anomalous cases in the study of leukæmia.

The Electric Relation of the Heart in Tetany.—The late Dr. H. F. MÜLLER published a note on this subject (*Deutsches Archiv f. klin. Med.*, Band lxi. p. 632), the importance of which is obvious. Von Ziemssen had shown that the exposed heart reacts to electric currents as do the striped muscles. Müller examined a number of cases of tetany, beginning with weak currents, and increasing up to 15 or 20 milliampères, using the electrodes in different ways as had been done by von Ziemssen. In no case was it possible to influence the heart by the galvanic current, except that pain, especially in the skin, was followed by acceleration of the pulse. This corresponds with the clinical fact that the heart is not involved in tetany. On the other hand, the phrenic nerves showed increased irritability to the galvanic current.

Tetany Checked by Pylorectomy for Cancer.—ALBU (*Archiv f. Verdauungskrankheiten*, Band iv. p. 466) reports a case interesting in many particulars. The patient was a man, aged thirty-four years, ill for six months with vomiting, severe pain in the epigastrium, and emaciation. Examination showed dilatation of the stomach with decomposition of ingesta; neither lactic nor hydrochloric acid, no sarcinæ, no long bacilli. No tumor could be made out. The diagnosis of cancer of the pylorus was made more probable by the further course of the symptoms, which grew worse in spite of treatment. Lactic acid was present at times. One morning the patient had a sudden attack of tetany, incomplete, inasmuch as Trousseau's and the facial phenomena were absent. An operation, declined before, was now consented to. As the cause of dilatation, a small scirrhus of the pylorus was found. The pylorus was resected. Recovery followed. At the end of four months the patient had gained twenty-seven pounds. All evidence of tetany disappeared after the operation. The dilatation disappeared by the second month, and the motor power of the stomach also was normal by that time. Lactic acid did not appear again, nor was the secretion of HCl restored.

Albu looks on the case as strong proof of the toxic origin of tetany. He also shows, in opposition to some others, how tetany complicating gastric cancer indicates an operation more strongly than simple cancer, because the danger of tetany, as regards duration of life, is even greater than that of cancer. Incidentally, he condemns gastroenterostomy, with or without pylorectomy, as less likely to secure good results than resection with union of the two ends.

Diabetes Insipidus.—STRUBELL (*Deutsches Archiv f. klin. Med.*, Band lxii. p. 89) publishes some careful observations on two cases of this obscure disease, and throws a good deal of light on some of its problems. The two patients represented the mild and severe forms of the disease, and showed certain important differences. In both more water was excreted than was ingested (*i. e.*, in an experiment lasting a few hours). In the milder case the excretion ceased after long abstinence from water, with severe thirst, but no general symptoms. In the severe form long-continued lack of excretion was not observed, for the body soon became dangerously depleted and water could not be withheld on account of danger to the heart. In mild cases the absorption and excretion of water follow the same laws as in healthy persons. In health excessive quantities of fluid are excreted by the kidneys, the activity of which is practically unlimited. The insipidus patient excretes much water even without excessive drinking, and so is obliged to drink. It is therefore not permissible to speak of the polydipsia as the primary affection. This conclusion was confirmed by the condition of the blood, which rapidly became concentrated when water was withheld, but did not become abnormally dilute, even when larger quantities were taken. The observations did not clear up the question as to nitrogenous metabolism in diabetes insipidus.

In the mild case there was an increase, while in the severe case, with twenty litres of urine daily, the excretion of N was normal. In both cases NaCl was diminished. Inosite was not found. The insensible perspiration was diminished in both cases. Very curious was the fact that sweating in the hot air bath lessened the feeling of thirst. Neither sweating nor aseptic fever exercised a beneficial effect, though fever lessened the excretion of urine.

SURGERY.

UNDER THE CHARGE OF

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Fractures of the Radius.—DESTOT and GALLOIS (*Rev. de Chir.*, 1898, No. 10) has studied experimentally the fractures that occur in the lower end of the radius and the other bones forming the wrist-joint. The forearm was placed in varying relations to the hand, and a blow applied upon the olecranon. From these studies they deduce the following, among other conclusions:

The interosseous ligament plays but a secondary part in the transmission of force through the forearm. It assists the radio-ulnar ligaments in making a rigid joint between the radius and ulna. The blow upon the olecranon forces the ulna downward until it encounters an obstacle. In a like manner the radius is forced downward till it strikes the carpal bones, then its diaphysis penetrates its epiphysis because of its inertia, and produces a fracture.

When the hand rests upon the ground, extended to a right angle, without lateral inclination, the ligaments play no part. The anterior radio-carpal ligament plays no part. The interosseous is an accessory transmitting force. The fracture of the radius results from its close ligamentous union with the ulna and the transmission of force to it through the radio-ulnar ligaments.

In the presence of hyperextension the fracture is usually of the main bones. In abduction these authors found a fracture of the scaphoid, sometimes alone, sometimes associated with fracture of the radius.

When the radius is in abduction the radial apophysis is ordinarily detached and carried backward and outward. In adduction the internal portion of the radius is frequently the only portion fractured. Thus it is seen that the attitude in which the patient falls tends to influence the nature of the fracture.

The authors divide these fractures into three groups:

1. The epiphysis is detached and displaced in various positions. There is practically no intra-articular fracture.

2. The fragment is a bevelling of the posterior surface, while the anterior is left intact. This is the form described by Rhea Barton.

3. The epiphysis is crushed by the penetration of the diaphysis, and the fragments are separated from one another.

These three forms are capable of numerous variations.

These studies were made by the aid of the X-rays; they are clinically capable of demonstrating the results that follow falls in different positions.

The type that follows from falls on the thenar is different from that where the fall was on the hypothenar eminence. The anatomical and clinical varieties are identical.

From the practical stand-point the knowledge gained from the X-rays of the exact lesion influences the prognosis and the treatment. The work of the authors has, however, been to demonstrate its value in proving the correctness of theories regarding fractures in divers parts of the skeleton.

The Bloodless Reduction of Congenital Dislocations of the Hip.—KÖLLIKER (*Centralbl. für Chir.*, October 22, 1898) makes the following report regarding the cases which he has treated by Lorenz's bloodless method of reduction. He has had fifty patients, and has reduced sixty-four luxations. In fourteen cases the luxation was bilateral. Seven or eight plaster dressings were required, changed every fourth to eighth week. In thirty-eight cases the final results of the treatment were followed up.

Of thirteen bilateral luxations seven showed no resulting good; in six the transposition of the head of the femur persisted. Of twenty-five unilateral cases four were unsuccessful. In nineteen the transposition of the head of the femur into the acetabulum was secured, while two were cured and had normal motion in the joint.

The transposition of the head, even without the recovery of perfect function, makes a remarkable gain for the patient. The limb is lengthened, the locomotion facilitated, the scoliosis decreased, and the position of the pelvis and the consequent compensatory scoliosis reduced. As a result of the transposition there is frequently a diminution in the power of motion, especially abduction and inward rotation.

Sterile or Antiseptic Ligature Material?—HAEGLER (*Centralbl. für Chir.*, 1899, No. 5) reports the results of his study of this question. The numerous cases in which ligatures are discharged from wounds some time after an apparent aseptic healing has taken place lead him to make a careful study of the sero-purulent discharge found with them, and of the ligatures themselves. Cultures showed that the discharge was free from bacteria, but microscopic sections of the knots of silk ligature showed numerous bacteria in the ligature itself. The ligature material had been carefully tested before it was used, but still the bacteria were found. The author then made the observation that a perfectly sterile ligature drawn through the hand, sterilized so far as possible, would yet become infected from the skin. If, however, the hand was recently dipped in sublimate solution the infection did not take place. As a consequence he determined to employ sublimated silk ligatures. The desired result was then attained, and no further discharge of ligatures has been noted since this plan was adopted, some three months before the time of writing. It is not necessary to leave the ligatures in sublimate solution for a long period, as the same result can be obtained by boiling them in the solution.

Bardenheuer's Operation for Hypospadia of the Glans Penis.—BREUER (*Centralbl. für Chir.*, November 5, 1898) describes a new operation for this form of hypospadia as it is performed by Bardenheuer.

The skin on the lower surface of the penis above the glans is dissected back and the urethra freed by dissection from the spongiosa for such a distance that it can be readily carried to the end of the penis. The gland is then perforated by a trocar, where the urethra should pass; the freed urethra is drawn though this canal and stitched in position. The skin is then united by a sufficient number of sutures.

The after-treatment consists in the employment of boric-acid ointment, which is frequently removed. The stitches are removed on the eighth to the fourteenth day. The results are all that could be desired both functionally and from a cosmetic stand-point.

The Treatment of Infection by Antistreptococcus Serum.—In a discussion of the Surgical Society of Brussels (*Ann. de la Soc. Belge de Chir.*, 1899, No. 9) different members gave the following as the summary of their opinions on this subject:

DAUDOIS said: Those results alone are considered where recovery takes place after injections of the serum; but the cases are not considered where the effects are not notable or where death occurs, and in cases where the patient recovers it is not considered whether or not he would have recovered of himself if left without treatment.

WILLEMS said: For my part, my experience is insufficient to judge from; but in cases of grave infection I would employ the injections and make a bacteriological examination later, stopping the use of the serum if the case did not show the streptococcus. If they are found I would continue the injections as the most reliable means we now have of combating their effects.

DEBERSAQUES expressed the following opinion: I have obtained marked results by injections about the erysipelatous area. In cases of general infection the serum is an adjuvant, but surgical treatment loses none of its indications nevertheless.

LAMBOTTE reported ten cases, and said: Although bacteriological examination was wanting in many of my cases, the results seem to point to the conclusion that the serum is more efficacious the earlier it is applied. It should, I believe, be used as a preventive where infection after operation is suspected.

Laparotomy in Tubercular Peritonitis.—DELANGRE (*Ann. de la Soc. Belge de Chir.*, 1899, No. 9) reports seven cases, from which he deduces the following conclusions:

1. Tubercular peritonitis abandoned to itself may terminate occasionally in spontaneous cure; it is for this reason that medical treatment occasionally succeeds, especially in the fibrous form, which has the most marked tendency toward recovery.

2. The preferable treatment is the surgical—that is, laparotomy—as its

mortality is *nil* and its results are superior to puncture, which exposes to the danger of injury to the intestines, especially in cases where there is little or no fluid.

3. The late results are variable—that is, the cases are divisible into three groups: the first vegetate and soon die and are the more grave; the second peritonitis, caseous or ulcerative; or, the third, in addition, those that have marasmus and are operated on in the final crisis of the disease. The second live improved for some time. The third group comprises those in which the laparotomy is the point of departure of a new life, and here the numbers increase when operation is undertaken as soon as the diagnosis is established, and there is no doubt that the laparotomy saves these patients from tubercular disease, of which the peritonitis is but the local manifestation of the hereditary taint.

4. Laparotomy performed for a tumor that is coexistent with tubercular peritonitis is not sensibly aggravated by its presence. The author refers only to the fibro-granular form, which is the only one he has met under these circumstances.

5. Laparotomy is an excellent operation when it is performed at an early date, but it becomes bad practice when it is employed in the later stages of the infection, since it exposes to shock while offering little hope, and it may be the end.

6. The invasion of the apices of the lungs, serous pleurisy with slight effusion, is not an absolute contraindication, since these lesions, if commencing and limited, may be cured by the operation. On the contrary, acute miliary tuberculosis, extensive lesions of the lungs, tuberculosis of the liver, the kidney, or the intestines, tuberculosis in the genitalia being excepted, are contraindications to the surgical intervention. Such diffusion of the infection indicates the powerlessness of the system to react, and hence intervention cannot expect to aid or to be aided.

7. The reproduction of the ascites after treatment by laparotomy is treated, according to the circumstances, by a new laparotomy or by repeated punctures, abdominal massage, iodide, collodion, etc., which sometimes succeed in producing a definite cure.

The Immediate Correction of the Deformities of Pott's Disease.—In a careful and critical study of this method of correcting the deformity of Pott's disease, WIART (*Rev. de Chir.*, 1898, No. 11; 1899, Nos. 1 and 2) says of the operation itself that the rapid correction under chloroform places the patient in danger of death while under the anæsthetic or in a few days after the operation.

Like all other operations upon tubercular subjects, there is danger of accelerating the progress of lesions already acquired or of provoking new ones. Grave paraplegic phenomena have resulted, but much more frequently the existing conditions have been ameliorated. Injuries due to the application of the apparatus are frequent and sometimes require the liberation of the patient at the risk of a return of the disease. Nevertheless, if the results of operation prove its value these risks should be taken.

The results of this operation, so far reported, he summarizes as follows:

The general condition seems to have been influenced favorably, although there are a number of cases where there was a generalization of the disease. The amelioration might, however, have occurred if the same care and hygiene had been applied without the operation.

The abscesses do not seem to have been influenced either way by the operation. The paraplegic phenomena seem to have been aggravated in some cases, but more frequently been ameliorated or entirely cured. These results have been obtained by other methods of extension or suspension.

The actual correction of the deformity has not been as yet proved to be permanent, and the author doubts if its value can compensate for the nine cases of sudden death already reported.

Besides the cases where the correction of the deformity was found impossible because of anchylosis or the age of the deformity, or where it was impossible to keep the patient in a fixed dressing, there are two distinct groups:

1. The truly favorable cases. They are too few. Only one is reported where the patient does not have to wear a corset. The others are still in fixed dressings.

2. The partial or complete failures, where the deformity is produced either partially or completely, may also be divided into two classes. On the one hand, where the deformity returns immediately after the removal of the corset or shortly after; on the other, where it recurs within the apparatus. Here it is discovered, when the corset is removed, either completely returned or partially.

The reports of cases in which there is "diminished deformity" the author does not think can be considered as favorable cases, as the term is too indefinite, and it is impossible to say what the improvement really has been or if it will remain.

Clinical experience has demonstrated that if we would avoid accidents that are serious we must choose our cases: those that are in a good general condition and have no pulmonary lesions. Among these those should not be touched who have anchylosis that is old and solid. The correction of these cases is not possible.

Of all the cases in which the deformity is not fixed those alone seem capable of a complete cure that have had a gradual development and are not severe.

In the other cases that are more ancient and severe, there is a diminution, more or less, in the deformity, but almost always there is no benefit.

Pathological anatomy makes it certain that there can be no complete and firm anchylosis following these operations between the separate segments, and also that nothing of this nature can be expected later, so that the results will be less and less satisfactory.

Voluminous Myxoma of the Bladder.—VERHOOGEN (*Ann. de la Soc. Belge de Chir.*, 1899, No. 8) reported to the society the case of a child, six and one-half years old, from whom he removed by suprapubic cystotomy a myxoma the size of a lemon. The bladder was distended and reached to the umbilicus. There was a slight cystitis due to repeated catheterization. The pedicle of the tumor sprang from the base of the bladder, and sent a prolongation into the prostatic portion of the urethra that had dilated it so much that the index-finger could be readily inserted after its removal.

The same author also reported a case in which a large tumor occupied the cavity of Retzius. The patient was a male, thirty-five years old, and had had for three months a large swelling in the lower abdomen. The tumor was hard, immobile, rounded, and extended to within a few fingers' breadths of the umbilicus. There were no intestinal symptoms save a slight cystitis. In the right groin there was a small fistula that had persisted after an operation for radical cure of hernia.

The operation showed that the tumor was an abscess of the cavity of Retzius, with very thick, fibrous walls containing caseated pus. The infection had probably occurred through the fistula in the hernial wound.

PEDIATRICS.

UNDER THE CHARGE OF

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AND

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Polyuria and Polydipsia in Childhood.—At a recent meeting of la Société Médicale des Hôpitaux (*Revue Mensuelle des Maladies de l'Enfance*, March, 1899, p. 124) two interesting cases were reported, one by AUSSET, the other by VARIOT.

Ausset's patient was a boy, aged four years. The affection had followed an attack of gastro-enteritis at the age of eighteen months, and had become aggravated during an attack of measles sometime thereafter, since which it had remained in the present condition. The child drank and eliminated by the kidneys about ten litres of liquid daily. The stomach, however, showed little if any dilatation, and the liver was not appreciably affected. The temperature was normal and the embonpoint preserved. The elimination of urea, which, six months earlier, was 20¼ grammes daily, had at the time of the report diminished to 10½ grammes per day. This child presented no physical stigmata of hysteria, but was emotional and subject to fits of anger, with an extremely neuropathic heredity from both parents. The speaker was inclined to consider the affection hysterical.

Variot's patient was a boy, aged three years. He drank about five litres of fluid daily. The stomach was extremely dilated. The polydipsia had begun at the age of eleven months without definite cause. It was interesting to note that the mother had had polyuria and polydipsia until the age of seven or eight years; that her mother had had the same affection; that the child's father was an alcoholic; and that a sister, dead at the age of seventeen months, had also been polyuric and polydipsic. At the autopsy of this sister it was found that the liver presented lesions of diffuse sclerosis, resembling those found in heredo-syphilitics.

Treatment of Epidemic Cerebro-spinal Meningitis by Inunctions of Unguentum Crede.—GUSTAV SCHIRMER (*New Yorker medicinische Monatschrift*, 1898, vol. x. No. 11) reports nine cases of this grave disorder occurring during a severe epidemic in Chicago in the spring of 1898, which were treated with successful results by inunctions of unguentum Credé. The gravity of the cases may be judged by the following abstracts:

E. B., aged eleven years, severe symptoms after ten hours' illness. Ointment begun at once. After each inunction the child became quieter. In fourteen days the child was well.

H. H., aged four and one-half years, already treated by others for four days. Crossed paralysis of arm and leg, strabismus, ecchymoses upon hands. Temperature some days rose to 106° F.; there were marked swellings of the right wrist and left elbow, involuntary evacuation of urine, and offensive stools. The severer symptoms subsided after four days, and in twelve days had disappeared. During the next ten weeks the condition varied; violent headaches disturbed her sleep, and emaciation became extreme. Complete recovery after three and one-half months. Three ounces of ointment used altogether.

E. E., aged eight and one-half years, showed excessive rigidity of the muscles of the neck, the head being drawn back almost to a right angle with the spinal column. Rapid improvement, but with frequent relapses during the nine weeks of illness. In all, two ounces of ointment were used. Good recovery.

A. K., aged six years. An undoubted case. Rapid improvement. Fourteen days later two younger children fell ill with convulsions, were treated by another physician, and died in three days. Six weeks afterward the patient was still emaciated and weak, but, according to the mother's statement, quite well.

H. M., aged eight years. Distinct rigidity of nuchal muscles. Temperature 105° F.; violent vomiting. Ill only a few hours. A yellowish, blood-stained secretion drained from the nostrils for ten days. Two ounces of ointment were used. Relapses sometimes lasted only one day.

O. F., aged twelve years. Defervescence after ten days, then sudden increase to 104° F. Complete recovery after four weeks.

The cases that were treated at once with the inunctions made rapid recoveries without any serious disabilities. Even those in which the treatment was not begun at first, and showed severe symptoms, recovered. In no case did defects of special senses remain.

The method of treatment embraced inunction of one ounce of unguentum Credé daily for three days, and the further use of one-third of an ounce at each relapse; very hot-water applications to the spinal column, to relieve pain; antiseptic cleansing of the nasal passages as soon as the condition of the patient permitted it; and small doses of trional when there was great restlessness.

[In view of the great fatality of cerebro-spinal meningitis when epidemic, the experience of Dr. Schirmer with the ointment of soluble metallic silver is worthy of very serious attention and further confirmatory experiment.—ED.]

Diphtheria Antitoxin by the Mouth.—JOHN ZAHORSKY (*New York Medical Journal*, March 19, 1898) reported early last year the results of administering antitoxin by the mouth in a series of nine cases of the disease, all of which recovered, and also as a prophylactic measure in about forty cases which had been more or less exposed to the infection. In spite of Escherich's failure (*Wiener klinische Wochenschrift*, 1897, S. 799) to detect antitoxin in the blood of infants after a dose had been given by the mouth, Zahorsky now reports (*Archives of Pediatrics*, March, 1899, p. 171) that he has used this method for immunizing fourteen cases in private practice, and one hundred and fifty in the Bethesda Foundling Home, St. Louis. Twice in this institution, after an outbreak of diphtheria among the inmates, were the infants given antitoxin or antitoxic milk by the digestive tract, and none contracted the disease. An apparent exception to this occurred, but it was shown that the baby had vomited the antitoxic milk. Clinically, therefore, it seems demonstrated that antitoxin can be absorbed by the digestive tract. The author refers to a study by FISCH (*New York Medical Journal*, April 9, 1898), based upon a large number of experiments on animals, in which the conclusion is reached that antitoxin reappears after twenty-four to thirty-six hours, but that none of it can be found after five, six, nine, and eleven hours.

These facts, Zahorsky believes, together with his own clinical experience, certainly establish that antitoxin *per os* is absorbed after thirty-six hours, and therefore, as a prophylactic measure, is perfectly effective.

Primary Congenital Hypertrophy of the Heart.—SIMMONDS (*Münchener medicinische Wochenschrift*, 1899, No. 4, S. 108) reports under this heading the post-mortem findings in the body of a newborn infant—the issue of healthy parents and normally developed—which had died during delivery. All the abdominal and thoracic viscera, excepting the heart, were well developed and presented the microscopic alterations of their tissues. The great vessels, the canal of Botal, the umbilical vessels, fossa ovalis, and the valves of the heart, were perfectly normal in condition. The dimensions of the heart, however, were extraordinary, measuring 5½ cm. in length, 6 cm. in breadth, and 14 cm. in circumference at the base. Its capacity was 45 c.c., and it weighed 44 grammes instead of 19 to 20 grammes, the normal weight of the heart of the fœtus at term. These excessive dimensions were due to a uniform hypertrophy of both ventricles, the right having a thickness of ¾ to 1 cm. and the left of 1 to 1¼ cm. There was no myomatous neoplasm localized in the form of a tumor. The only feature that distinguished this fœtal hypertrophy from the cor bovinum of the adult was that the papillary muscles participated only slightly if at all in the enlargement. Histological examination of the myocardium revealed no abnormality except some recent ecchymoses near the surface.

The author thinks that this condition of congenital hypertrophy is to be attributed either to circulatory disturbance or, as Virchow holds, to a diffuse myomatous neoplasia of congenital origin. In favor of the latter hypothesis was the fact that the hypertrophy involved only the ventricular walls and the septum, and not the papillary muscles.

Anasarca Due to Adherent Pericardium, Probably Tuberculous.—MARFAN (*Bulletin Médical*, 1898, No. 102, p. 1183) reports a case in a boy, aged three years, in whose previous history had occurred a pustular eruption three months before, following vaccination. On admission he presented general anasarca. The urine was free from albumin. The skin was cyanotic, and the liver was found to extend four finger-breadths below the border of the ribs. Physical examination revealed the symptoms considered by Weill, of Lyons, as chacteristic of tuberculous adhesion of the pericardium: 1. The heart is scarcely at all increased in volume. 2. There is neither dyspnœa nor palpitation. 3. The apex beat is located with difficulty. 4. There are no murmurs. 5. The character of the cardiac impulse. In favor also of the tuberculous nature of the trouble was the existence of bronchial adenopathy.

The prognosis of adherent pericardium, whether of rheumatic or tuberculous origin, is always grave. In case of tuberculous disease, early in the course cardiac tonics will be of value in preventing œdema and sustaining the strength of the heart; but later there will come a time when these remedies will fail of their effect, and œdemas will persist, respiratory embarrassment follows, and death from respiratory failure. In other cases the patient dies from some intercurrent disease, like broncho-pneumonia, or from another tuberculous complication, like meningitis, or a generalized tuberculosis. In all cases, according to statistics, the usual duration of the disease is one year. In children, however, sometimes unexpected remissions take place, but not cure, since young tissues possess a reparative power unknown in later life.

THERAPEUTICS.

UNDER THE CHARGE OF

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Nitrous Oxide and Its Uses.—Dr. W. J. McCardie maintains that nitrous oxide is a true anæsthetic, producing, first, excitement of the mind, next of the motor centres, and, lastly, stimulating circulation and respiration. In the same order depression follows excitation. Function returns in the reverse order. It acts most powerfully on the central nervous system, the peripheral nerves being but little affected. Under the administration of the gas the blood-corpuscles darken markedly, and the cynosis is due to this and the diminution in the amount of oxygen present. There is no chemical conversion of the gas circulating in the blood. It enters the body and leaves it as nitrous oxide. The oxyhæmoglobin spectrum of the blood is unaltered. It is not an asphyxiant, for narcosis occurs *before* the oxygen is exhausted. The heart's action is influenced but little, and pulsation continues for perhaps one minute. Thus even when complete cyanosis has been reached, and absence of respiration, a few vigorous compressions of the chest restore the breathing and resuscitate the patient. In complete narcosis there is a change in calibre of the renal vessels to correspond with change in arterial pressure;

renal secretion is rapidly lessened, and transitory albuminuria and glycosuria may occur. There are no serious sequelæ. The mortality following the use of nitrous oxide in America is two deaths in three million administrations. Deaths are usually due to mechanical causes, as impaction of a tooth in the air-passages. In producing narcosis the position of the patient is of great importance. A semi-recumbent posture is dangerous, for the blood is thus swallowed, foreign bodies drop back into the pharynx instead of forward, etc. Patients should sit upright until unconscious. Attempts to prolong anæsthesia by continuing the exhibition of the gas have generally met with favor. Methods are: 1. Subsequent nasal inhalation. 2. Passage of nasal catheter to pharynx and inhalation carried on through the catheter. Introduction of a tube into the pharynx and gas forced into the air-passages has met with success at the hands of the writer. Closure of the nostrils is advocated to prevent escape of gas and ingress of air. Anæsthesia has been maintained in this way for ten minutes consecutively. Vansant recommends that in headache (especially frontal) the nasal accessory sinuses be forcibly syringed with a stream of nitrous oxide. Much relief has followed, even where the condition has become chronic. The author recommends a mixture of the gas with pure oxygen, for in this way the large amount of inert nitrogen of the air is replaced by a correspondingly useful amount of the nitrous oxide. Thus anæsthesia is certain, and there is a sufficiency of oxygen to prevent cyanosis. The proportions recommended are from Hewitt's book: Two-fifths oxygen and three-fifths nitrous oxide. Average time required to produce anæsthesia is two minutes, and the same for recovery. Women, old people, and children bear the mixture better than strong male adults. Alcoholic patients of either sex do badly. Previous to ether inhalation nitrous oxide is of great advantage, for it shortens the induction of anæsthesia, obviates the excitement, rigidity, and irritation of the pharynx caused by primary ether inhalation. There are different methods of administering the gas, depending on the form of apparatus used.—*The Birmingham Medical Review*, vol. xlv. p. 65.

The Bicycle in the Cure of Hernia; Exercise and Hernia.—Dr. Lucas Championnière reviews a paper by Loir on "The Cure of an Inguinal Hernia by Bicycling," reaching the following conclusions: But two methods of treating rupture have been practised—either operative interference or bandaging of the abdomen. Recently Swedish movements have been advised. In Loir's patient a rupture had been present four years, and following the use of a low ("safety") bicycle the hernia less often came down into the scrotum, and finally no rupture was present at any time. After four months the abdomen was much smaller in girth and the walls more resistant. The author remarks that there may have been a masking of the rupture, without actual cure. He objects to the general view that because hernia is the result of an unusual effort, therefore all muscular activity should be prohibited. Violent effort will do real damage, but regulated moderate exercise will, on the contrary, improve the condition of the patient. He cites the working-man who for years continues his labor with a rupture indifferently supported by bandaging, no ill result following; whereas it is in the patient tending to corpulency, of sedentary habit, that most urgent complications arise. The abdominal wall, by prescribed lack of exercise, is persuaded to relax, and grows fat and feeble. Where active exercise is to be taken a bandage furnishing rather more support than that ordinarily worn is recommended. Of the ruptured who ride a bicycle some wear bandages and others do not, and of the former many abandon their bandages after they have mounted. The rupture no longer descends, giving no further trouble until the vertical position is again assumed. Tricycle and bicycle are recommended to be properly used—and in some cases the stationary bicycle—by patients in whom ruptures have become irreducible and very painful.

Bicycling is serviceable in the treatment of hernia as follows: It dispenses temporarily with the vertical position of the patient—which so favors the descent of the rupture. It does away with vertical oscillations of the centre of gravity, which act in the same pernicious manner as the vertical position. It is, lastly, a very active form of exercise. The muscles of the trunk are greatly exercised, with excellent results. And, in general, bicycling is a most excellent hygienic measure. Properly followed, a marked diminution in abdominal fat occurs, and on this the author lays much stress. Two mistakes are especially pointed out: Patients with rupture must not ride at great speed, and they must avoid hills. Further, a high bicycle is contraindicated. The seat is to be noticeably behind the pedals, so that the legs will form quite an angle with the trunk of the rider. The position assumed on the old velocipede is that sought rather than the present vertical posture. Falls are thus rendered less frequent—a distinct advantage for the ruptured. Following operation for the cure of hernia a long interval should elapse before violent exercise, such as fencing or horseback riding, is resorted to. But one month from the time of operation the author believes sufficient to have elapsed before recourse is had to bicycle riding as above restricted.—*Journal de Médecine*, T. lxx. p. 81.

Thiocol.—DR. G. ROSSBACH states that this substance is potassium orthoguaiacol sulphonate, and is produced as a colorless, thoroughly permanent powder, soluble in equal parts of water. Even in very concentrated solutions it is not caustic when applied to mucous membranes. Extensive experiments upon animals demonstrated that this substance is much more readily absorbed than all other creosote or guaiacol preparations. In 20 per cent. aqueous solution it may be administered hypodermatically, and this without producing local irritation. Further, the harmlessness of this substance both *per os* and by subcutaneous injection seems to be established. —*Therapeutische Monatshefte*, 1899, Heft 2, S. 96.

Formalin in the Treatment and Removal of Inoperable Malignant Growths.—DR. WILLIAM MITCHELL used a 1½ per cent. solution of formalin, constantly applied, to an inoperable recurrent sarcoma of the cheek, with the result that hemorrhage, which had been almost constant, was wholly stopped, and a hardening of the malignant tissue followed. Small amounts of this non-vascular transformed tissue were removed daily with a scalpel, no hemorrhage being encountered. At length the whole tumor was thus removed piecemeal. Pain, at times severe, was checked with anodynes. Occasionally œdema of eyelids and lips was caused by the absorption of the formalin.

The application being suspended temporarily, a line of demarcation like that in dry, senile gangrene appears. Advantages of this method are: 1. Simplicity; no anæsthetic required, and no shock follows. 2. No suppuration ensues, formalin being both aseptic and antiseptic. 3. Is bloodless, and valuable in any very vascular growths. 4. Great penetrating power; a "necropoietic" process, with no discharge. 5. The limit of the necrosis can be seen while the paring away is in progress, and thus is indicated where next to apply the formalin. 6. Safety, if care be exercised. Objections are pain, which is severe, and œdema; should the latter extend to the glottis a fatal result might follow. Systemic formalin absorption causes a general urticaria, which can be well treated with a lotion of carbolic acid.—*The British Medical Journal*, 1899, No. 1989, p. 337.

The Treatment of Anal Fissure.—DR. L. CONITZER reports six instances of complete recovery in from six to twelve days by means of ichthyol. For the first examination and application the fissure is anæsthetized with cocaine. The ichthyol is applied pure upon a bit of cotton or by means of a glass rod. This application should be repeated every day or every second day, care being taken to avoid constipated motions. The pain following the cauterization by ichthyol is not severe or lasting, and epithelial formation goes on rapidly.—*Münchener medicinische Wochenschrift*, 1899, No. 3, S. 80.

Tropon.—DR. RUDOLF NEUMANN describes this as a brownish, fine, unalterable and non-hygroscopic powder, which is absolutely insoluble in water. It is made from albumin derived from vegetable and animal sources, two parts of the former to one of the latter. It is from about 81 to 90 per cent. pure albumin, and contains gelatins and extractives. According to Finkler, about 95 cent. of the food is utilized. After considerable experimentation the following conclusions are reached: 1. This can completely replace the albumin of other nutritive substances. 2. It does not produce any unpleasant disturbances in either health or disease. 3. It does not become repugnant after long-continued use. 4. The persistent, not unpleasant but marked taste, may be concealed by various foods. 5. It is cheaper than meat.—*Münchener medicinische Wochenschrift*, 1899, No. 2, S. 42.

Immunization by Ethylic Alcohol—DOTT. LUIGI MARAMALDI presents an important paper based upon laboratory experimentation. He reviews the brief report of Toulouse upon the sero-therapy of acute alcoholism, published three years ago, and the work of Ehrlich, showing that the antitoxins (antiricin, antiabrin) may be produced in the blood by successively increased doses of ricin and abrin, is cited. The observations of Giacosa as to strychnine are properly declared of negative value. Dogs were subjected to increasing doses of alcohol administered, well diluted, through the œsophageal tube until tolerance was established for a larger than an ordinary lethal dose. The serum of these animals was employed in the experimentation. He concludes that (1) it is possible to confer a real immunity in dogs by administering progressively increasing doses of this poison, ultimately reaching very large doses without producing functional disturbances or organic degenerations; (2) the serum of such a dog rendered immune to alcohol contains a special antitoxin capable of neutralizing the toxic action of a dose of alcohol one-fourth larger than the minimum fatal dose; (3) normal blood-serum does not possess the power of augmenting the organic resistance to alcohol, much less to explain the curative action in acute poisoning.—*Gazzetta Internationale di Medicina Practica*, 1899, No. 1, p. 9.

The Treatment of Traumatic Tetanus with Antitoxins.—Dr. S. Copley reports three patients thus treated during the last two years. In all the symptoms were well marked, following septic wounds. Subcutaneous injections of tetanus antitoxin were given, and in two instances occasional doses of chloral and the bromides were added. One patient was treated entirely with Tizzoni's antitoxin, the second with a combination of the above and antitoxin prepared by the British Institute of Preventive Medicine. The third patient was given antitoxin derived from the latter source.

The dose should be large—one hundred and fifty grains at once, and repeated every six hours until some effect is produced. In any very severe infection—*i. e.*, where a large area has been wounded—as much as seven hundred and fifty grains should be injected under anæsthesia, and repeated in four hours. While in diphtheria a second injection is frequently not required, in tetanus it is advisable to repeat the dose at twelve-hour intervals at least. Disagreeable sequelæ were urticarial or erythematous eruptions. The writer believes that too small doses have heretofore been given, with consequent unsatisfactory results.—*The British Medical Journal*, 1899, No. 1989, p. 337.

The Treatment of Typhoid Fever by Subcutaneous Injections of Artificial Serum—Dotts. Giglioli and Calvo have made use of this method in eighteen instances of this disease. Probably because never more than a pint of fluid has been injected, and that slowly and at low pressure, no disagreeable symptoms have been noted. In the early stages of the infection this reaction is marked, the lowering of the temperature is considerable, and the general level is depressed with the increasing number of injections. With high temperatures there is likely to be little or no reaction, and but little subsequent lowering. During the reaction the pulse is accelerated, but of good force and regular; later it becomes slower, broader, and less dicrotic. In some instances the urine seemed to be increased; in others there was a diminution. Sweating followed the injections. In favorable termination the decrease in the size of the spleen was marked. The general condition, in the majority of instances, was bettered, particularly when there was a marked lowering of temperature and an improvement in the pulse. While these injections cannot be called a cure for the infection of typhoid fever, it is certainly true that in relatively benign infections they relieve symptoms. When it is more severe their rôle is still more difficult to establish, and in very severe types of the disease they may be of no use.—*La Settimana Medica*, 1899, Nos. 4, p. 37, 5, p. 49.

Experimental Antistreptococcus Sero-therapy.—Dotts. A. Bonome and G. Bombini, from an elaborate study, have reached the following conclusions: 1. In the body of streptococci is found a substance which gives many chemical reactions similar to those of protein. This is partially soluble in water, or in weak solutions of sodium carbonate manifests a toxic action in animals sensitive to streptococci (rabbits). This can be obtained from cultures by means of a weak potash solution, and, later, treatment by acetic solutions. 2. This substance, extracted from cultures, acts upon rabbits in the same way as the bodies of streptococci killed by prolonged drying and trituration in a mortar. 3. By means of inoculation of this protein into the veins of rabbits in progressively increasing doses it is easy to produce an immunity in these animals, but only for that particular species of streptococcus from which the protein was obtained. 4. There undoubtedly exist different species of streptococci, differentiated by their form or grouping or other biological properties, but especially by their different resistance to desiccation by their dissolving action upon hæmoglobin. 5. The toxicity of this protein varies according to the species of the streptococci from which it is obtained. 6. The immunity which is produced in rabbits toward a single species of streptococci is principally a passive one and connected with a modification of the tissue-elements. The serum of rabbits immunized by this protein possesses but a weak bactericidal power against streptococci, and does not certainly prevent the development of septicæmia when mixed with a minimum fatal dose of streptococcic culture *in vitro.* It does not actively confer immunity in rabbits against various species of streptococci nor suspend the development of a streptococcic septicæmia.—*La Riforma Medica,* 1899, No. 7, p. 75 *et seq.*

On the Action of Some Essential Oils and Other Volatile Substances on the Growth of the Bacillus Tuberculosis and in the Treatment of Phthisis.—Dr. William Murrell records experiments made with oil of cinnamon and oil of peppermint. Twenty patients in various stages of phthisis were treated by inhalation, either constant or at intervals. Six months' trial ended in failure. Bacteriological experiments with these same oils were instituted. Tubes inoculated with tubercle bacilli were kept constantly exposed to currents of air impregnated with the above essential oils. Result, failure. The bacilli grew equally well with those in control tubes not exposed to the oils. A 6 per cent. solution of formic aldehyde substituted for the essential oils met with better success, exciting a marked retarding and inhibitory influence on the growth of the bacilli. Continuous exposure to "formaldehized" currents of air for two days completely prevents further growth of the bacilli. Clinical experiments resulted in very material benefit to twelve of fourteen patients. Inhalations of a 6 per cent. solution were generally used, but were increased or decreased according to individual idiosyncrasy. In some instances the inhalation was constant, in others once or twice a day; the latter gave better results. No other medication was employed except picrotoxin for night-sweats. Disadvantages, such as irritation of the pharynx and occasionally violent paroxysmal cough, were not infrequent. The writer believes in obtaining bacilli from the expectoration in phthisis, cultivating them, and experimenting with various volatile substances until one is found that arrests their growth, and this is to be administered to the patient by inhalation. Added to this must be hygienic measures—fatty foods and cod-liver oil.—*The British Medical Journal*, 1899, No. 1987, p. 202.

GYNECOLOGY.

UNDER THE CHARGE OF

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Torsion of Parovarian Cysts.—BOUILLY (*La Gynécologie*, December 15, 1898) calls attention to the rare occurrence of torsion of the pedicle in true parovarian cysts, and to the fact that, while the clinical symptoms are the same as those which result from this accident in the case of ovarian neoplasms, the anatomical changes in the cyst itself are much less marked. Instead of the extreme congestion, intra-cystic hemorrhage, and necrotic changes observed in ovarian cystomata, twisted parovarian cysts may present a nearly normal appearance, the contents being unchanged. This difference is explained by the greater thickness of the pedicle in the case of the latter, so that the circulation is not interrupted, while the vascularity is also less. The writer reports two cases which presented typical symptoms of torsion, yet on opening the abdomen non-pedunculated parovarian cysts were found, the walls of which showed evidences of necrotic changes, one of them containing old blood-clots. He was unable to explain the condition unless on the theory of traumatism, or necrobiosis of the cyst-wall and rupture of its vessels due to pressure or torsion of the broad ligaments, both of which were unsatisfactory.

Intra-abdominal Shortening of the Round Ligaments.—DOLÉRIS (*La Gynécologie*, December 15, 1898) reports seven successful cases operated upon by his method, which is briefly as follows: After separating adhesions and removing one or both adnexa if necessary, both round ligaments are caught with forceps or ligatures at points midway between the uterine cornua and the internal rings, and the two loops thus formed are brought up to the lower angle of the abdominal wound, where they are secured by sutures of silk or catgut, which include the peritoneum, muscle, and fascia. The abdomen is then closed in the usual manner.

Early Diagnosis of Cancer of the Uterus.—HEITZMANN (*Centralbl. für die ges. Therapie*, July, 1898) emphasizes the fact that pain, metrorrhagia, and foul discharges are late symptoms of malignant disease of the uterus, which often mark the inoperable stage. Hence the necessity of recognizing the presence of carcinoma before these appear. He calls attention to an important aid to diagnosis, which he first published twenty years ago. If a pledget of cotton soaked in a 10 per cent. solution of sulphate of copper be applied for a minute or two to a suspicious erosion on the portio vaginalis the surface will become quite blanched if it is a mere ectropion. If it is a simple erosion a thin, bluish-white coating will form, without hemorrhage. By repeating the applications at intervals of three or four days the erosion will be entirely healed at the end of a fortnight by the ingrowth of squamous epithelium from the periphery of the raw surfaces.

In the case of a cancerous ulcer, on the contrary, a light application of the solution of copper will cause bleeding, which can be checked by ferripyrin or perchloride of iron. A few days later the application is repeated. If the erosion diminishes in size, becomes less hyperæmic, and is surrounded by a pale ring of newly formed pavement epithelium, the suspicion of malignancy was unfounded; should the erosion again bleed more freely than before, the diagnosis of incipient carcinoma may be regarded as practically certain. In order to confirm the diagnosis additional applications may be made. The persistence of a single bleeding spot after the rest of the raw surface has healed is sufficient to establish the fact of malignancy.

At this stage amputation of the cervix will, in the majority of cases, result in a permanent cure.

When cancer of the endometrium is suspected a sound should be introduced and swept gently around the interior of the uterus in order to detect prominences or diseased portions of the lining membrane. If no bleeding follows its withdrawal the case is probably one of simple hyperplastic endometritis. If hemorrhage occurs an applicator wrapped with cotton saturated with the solution of copper is carried into the uterus. The bleeding will at once cease if the condition is benign, and a few applications will effect a cure. If the hemorrhage is increased at each application the existence of cancer should be suspected, and the curette is used to confirm the diagnosis. Changes in the glandular epithelium are sought for, since the glands form the starting-point of the disease. The writer has rarely failed to find such microscopical confirmation of his provisional diagnosis based upon the recurrence of hemorrhage after applications of the sulphate of copper. The value of this method of diagnosis is strikingly shown in cases of condyloma, syphilitic and tubercular ulcers, which heal readily under this treatment, cancerous surfaces alone being unaffected.

Cancerous Degeneration of Uterine Fibroid.—BEKMANN (*Wratch*, No. 38) reports the case of a patient, aged forty-one years, who had suffered from metrorrhagia for over three years. The uterus when removed was the size of two fists. Cancerous nodules were found in its wall, and in addition a submucous fibromyoma the size of an apple, microscopical examination of which showed that adeno-carcinoma had developed in the mucous glands covering it. A small cyst of one ovary had undergone similar cancerous degeneration, probably due to lymphatic infection from the uterus. As the malignant disease was not recognized before operation, the uterus was successfully removed by morcellation—a method of which the writer disapproves, on account of the risk of wound-infection.

Excision of the Entire Endometrium.—DÜHRSSEN (*Centralbl. für Gynäkologie*, 1898, No. 50) reports four cases in which the following operation was performed for obstinate hemorrhage: The anterior vaginal fornix is opened by a transverse or T-incision, the bladder separated, and the vesico-uterine fold of peritoneum incised. The uterus is drawn downward and is split in the median line from the cervix to the fundus. By making additional incisions as far as the cornua the whole interior of the uterus is exposed. The entire lining membrane of the organ is then excised with a narrow-bladed knife, after which the edges of the uterine wound are sutured, the uterus is replaced, and the peritoneal and vaginal wounds are closed. By careful dissection of the peritoneum it is possible to make the operation entirely extraperitoneal. The hemorrhage is not usually great, although in one case the writer was obliged to tie the uterine arteries.

The operation is advised in intractable cases of hemorrhagic endometritis, or suspected malignant degeneration of the corporeal endometrium in which hysterectomy is not advisable.

Median Colporrhaphy.—SÄNGER (*Centralblatt für Gynäkologie*, 1898, No. 51) describes the following modification of Le Fort's operation: The surfaces denuded are trapezoidal in shape, an inch long and two or three inches wide, and are situated in the middle of the vagina, extending on one side well out on the lateral wall. The opposite raw surfaces are united by a buried continuous catgut suture until their edges are reached, when silk is used. A canal is left on one side extending upward to the os externum. Perineorrhaphy is always performed, and amputation of the cervix, if necessary.

Tubal Calculi.—LITTAUER (*Centralbl. für Gynäkologie*, 1898, No. 52), during the course of an abdominal section, discovered several foreign bodies in Douglas's pouch, the largest of which was the size of an orange-seed. They were grayish in color and of stony hardness. A concavity was found in one tube in which they had evidently been lodged. Examination showed that they consisted of fat infiltrated with lime-salts.

Results of Igni-extirpation of the Uterus.—GELLHARN (*Centralbl. für Gynäkologie*, 1898, No. 52) reports the results of thirty-nine cases of hysterectomy performed in Mackenrodt's clinic by means of the thermo-cautery, with seven deaths. Seven cases of ureteric fistula resulted, and three of intestinal injury. There was no instance in which secondary hemorrhage occurred, and the pain after operation was unusually slight, the patient being up at the end of four weeks.

The ultimate results of igni-extirpation compare most favorably with those obtained by the ordinary methods. Three patients died from a return of the disease, but in no instance was there a recurrence in the cicatrix. Seven patients were well at the end of two years, seven at the end of one year, and four at the end of six months.

Cancer of the Prolapsed Uterus.—SCHMIDT (*Monatsschrift für Geb. und Gyn.*, Band vii. Heft 5), in reporting a case of this character, refers to the infrequency of cancer of the prolapsed uterus, as shown by the statistics of the Halle clinic, where, among 423 cases of operation for prolapse and 294 for cancer of the uterus, only two were recorded in which the two conditions were associated.

Simultaneous Occurrence of Fibromyoma and Carcinoma Uteri.—DE BONCAUD (*Revue Internat. de Méd. et de Chir.*, 1898, No. 14) believes that these neoplasms are associated more frequently than are supposed—in about three out of 100 cases, according to his observations. It has been asserted that fibromyomata, so far from affording a protection against malignant disease, actually favor its development. He denies the occurrence of cancerous degeneration of uterine fibroids, and affirms that the simultaneous development of both neoplasms in the same uterus is purely accidental. The symptoms presented are due to the malignant disease, as the fibromyomata are usually insignificant in size.

OBSTETRICS.

UNDER THE CHARGE OF

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Two Cases of Labor Complicated by Atresia of the Vagina.—EBERLIN, of Moscow, reports (*Zeitschrift für Geburtshülfe und Gynäkologie*, 1899, Band lx., Heft 1) two cases of this unusual condition.

In neither of these cases had there been any disorder of menstruation, and neither was aware of the condition which existed.

On examination the vagina was found in each case closed by a resisting membrane sufficiently firm to impede the exit of the fœtal head.

These patients were treated by dissecting out the membrane with scissors and closing the wound surface by stitches. There was considerable hemorrhage, which the stitches promptly controlled. In both instances the child was born without assistance, and the mother made a complete recovery. No evidence of cicatricial contraction was subsequently found in these cases.

Eberlin urges the necessity for dealing with these cases promptly before labor. He believes that otherwise hemorrhage with possible infection may occur.

The Function of the Thyroid Gland During Pregnancy.—In the *Zeitschrift für Geburtshülfe und Gynäkologie*, 1899, Band lx., Heft 1, LANGE contributes an interesting paper upon this subject, in which he gives the results of experiments and clinical observations. He agrees with others that enlargement of the thyroid gland is a physiological sign of pregnancy. He has observed that in acute kidney failure complicating pregnancy the thyroid is not enlarged, although this is not true in patients suffering from chronic nephritis who become pregnant. By experiments upon pregnant animals it was found that those which were pregnant required a much larger quantity of thyroid tissue than those which were not pregnant. If more than four-fifths of the thyroid was removed in pregnant animals tetany occurred, which was relieved by the administration of a compound of iodine and thyroid extract.

It was also found that non-pregnant animals could exist with but little thyroid tissue. If, however, those animals from whom a greater part of the thyroid had been removed became pregnant, they suffered from failure of elimination, which speedily went on to convulsions or coma unless relieved. The convulsions in these cases were not like those of tetany, and neither the convulsions nor coma was influenced by the thyroid compound administered. In the case of pregnant women suffering from derangement of the action of the kidneys thyroid preparations have a remarkable effect.

Treatment of Early Ectopic Gestation.—In the *Zeitschrift für Geburtshülfe und Gynäkologie*, 1899, Band lx., Heft 1, VEIT contributes a paper upon this subject, in which he urges that, in early ectopic gestation, if the sac of the ovum has not been ruptured, the entire ovum be extirpated as soon as possible. If the sac ruptures into the abdominal cavity, and hæmatocele does not form, abdominal section should be done at once.

When, however, hæmatocele has formed and is distinctly limited, operation should be undertaken for positive and complicating indications only.

In cases of tubal abortion, either with or without hæmatocele, and where a dead ovum is retained in the tube, there is no stringent call for interference. The patient should be kept under observation, and should not be interferred with unless some complication orignating in the tubes or surrounding tissues should arise.

Nature and Definition of Puerperal Fever.—In the *Centralblatt für Gynäkologie*, 1899, No. 1, OLSHAUSEN calls attention to the necessity for a rational definition of "puerperal fever" and a clear understanding of the difference between infection and intoxication. By infection he understands the presence and circulation of bacteria in the organs and fluids of circulation in the patient's body. By intoxication is meant the absorption from the birth-canal of the products of bacteria contained therein. While it is almost impossible to draw a sharp distinction in the matter, still it is important to understand as clearly as possible the two conditions.

He also draws attention to some infections which may enter the body through the birth-canal, and which do not strictly belong under the term "puerperal fever." Such are tetanus, scarlatina, and diphtheria. As regards gonorrhœa, its close resemblance to sepsis brings it on the border line of this condition. It is, however, essentially different from sepsis.

The writer urges that only those diseases caused by septic micro-organisms shall be included under the term "puerperal fever." The question whether infection or intoxication is present is of secondary importance. The subject has a medico-legal bearing when damages are claimed for infection and when registered midwives are accused of failure to obey regulations.

Automatic Pulsation of the Fœtal Heart.—OPITZ (*Centralbl. für Gynäkologie*, 1899, No. 1) reports the following instance in which the heart of the human embryo beat automatically for some time after delivery.

The first was that of twin labor in which the second child apparently perished. Its body was placed in a valise and brought to the hospital, and an autopsy performed about two hours after its birth. On opening the thorax the ventricles and great arteries were contracting, the interval of time being about three seconds between the contractions. The heart was then removed and placed upon a plate, after which pulsations gradually ceased.

In the case of the second twin similar phenomena were present. The pulsations of the heart lasted two and a half hours after birth, and more than two hours after all other signs of life had ceased.

He also narrates the case of an eight months old fœtus, very badly deformed, in which the trunk was so fissured that the viscera were distinctly visible. Although breathing did not occur, the movements of the heart persisted for more than one-half hour after birth.

Two Cases in which Fixation of the Uterus Subsequently Caused Complications.—Before the Italian Obstetrical and Gynecological Society at its recent meeting in Turin, PINZANI described the case of a multipara upon whom he had performed ventrofixation of the uterus, the stitches being just below the level of the Fallopian tubes. When pregnancy supervened, the uterus became dislocated, the cervix bending strongly backward and above the promontory of the sacrum. It was necessary to deliver the patient by Cæsarean section.

Guzzoni reported a case of dystocia which followed a median colporrhaphy. The operation was done for total prolapse of the uterus some years before. The median septum of the vagina and rectum was much thickened and widened, so that the passage of the finger through the vagina was much impeded.

A transverse position resulted, which could not be corrected. It was necessary to chloroform the patient and split the septum before she could be delivered.

Spontaneous Rupture of the Uterus During Pregnancy.—At the same meeting BORDÉ showed the specimens from a patient who died of spontaneous rupture of the uterus during pregnancy. This accident happened after a vaginal injection, and diagnosis was made too late for successful treatment. The autopsy showed degeneration of the uterine tissues at the upper margin of the lower uterine segment, and fibrous infiltration at the external os, which prevented normal dilatation.

The Resuscitation of Infants Apparently Dead.—In a *Dissertation* published at Marburg, 1898, STAHLER describes the methods employed in Ahlfeld's clinic to resuscitate children born apparently dead. Cases in which children do not breathe, but the heart continues to beat, are described as dead, but with persisting heart-action. In cases of cerebral pressure the same phenomena may be observed. In four cases, after the heart had ceased to beat, a few respiratory movements persisted.

The methods of treatment employed were to avoid manipulation, especially in all cases where intracranial hemorrhage was possible. The child is put in a warm bath, its mouth and nose cleansed, and it is closely watched. If the heart beats, and efforts are made to breathe, gentle external stimulation is practised. If the heart action fails the child is suspended by the legs for a quarter of a minute, and then air forced into the chest by the mouth of the operator. Artificial respiration is not practised in these cases.

Puerperal Eclampsia.—In the *American Journal of Obstetrics*, January, 1899, STEWART reports the case of a primipara who had eclampsia The urine taken at the time contained a large amount of albumin. The patient was delivered by dilating the cervix and using the forceps. The child was dead.

During her second pregnancy observations were made with her urine by experiments upon animals. That was selected in which the percentage of urea was deficient. The results of these experiments was to cause death in the animals injected, without convulsions. Acting upon this information, the patient was freely purged with calomel and jalap and put upon milk diet. The urine was albuminous, but not highly. She was delivered of a healthy living child and made a good recovery.

Stewart narrates twelve experiments with urine taken at random from patients in the wards of a maternity hospital. Convulsions and death often followed these experiments. From his own observations and those of others he comes to the conclusion that the urine of any patient habitually contains poisonous material, that during pregnancy these poisons increase in quantity, are imperfectly eliminated, causing failure of the kidneys, liver, and other eliminating organs, but when these poisons reach a sufficiently potential quantity eclamptic convulsions result.

His demonstration of the poisonous properties of urine containing a marked deficiency in urea coincides perfectly with our clinical observations upon the subject. While urea itself is not poisonous, its lessened elimination may be taken as an indication that poisons are retained and will shortly prove a source of danger.

Walcher's Position.—At a recent meeting of the Italian Obstetrical and Gynecological Society at Turin, PINZANI contributed a paper upon this subject. He had made a series of experiments, placing both living and dead bodies in Walcher's position and carefully estimating and measuring the degree of pelvic enlargement. Sixteen women in the puerperal state were investigated in this manner, and undoubted increase in the antero-posterior diameter of the pelvic brim was observed. These patients, a few days after delivery, were placed upon the side and the conjugate measured, and then were measured when the thighs were flexed and when the legs were extended and carried strongly backward.

A second series of forty-five patients was also investigated. In these the true conjugate was measured by the fingers while the patient was in the lithotomy position, lying upon the back, and in Walcher's position; and in the last a decided enlargement of the conjugate was observed.

The third series of observations was made upon two cadavers, and here the results were striking. From these studies Pinzani concludes that the greatest enlargement in the true conjugate is obtained when the patient is first placed upon the back and then in Walcher's position. In contracted pelves as much as two millimeters is gained in this way. The increase differs considerably in different cases, varying from 9 to 7 millimeters upon the living patient. This posture will give the best results in cases where the contraction is at the entrance to the pelvis, as in flat and generally contracted pelves. Forceps and version are very frequently indicated with the gain in pelvic room given by this position, and many difficult labors are made less severe by its employment. At the moment there is in these cases, also, less danger of serious injury to the pelvic floor and posterior wall of the vagina.

In discussion Pestalozza drew attention to the increase in the transverse diameter of the pelvic brim when the patient is in this position. It is interesting to determine whether the sacro-iliac joints move during extraction of the child with the patient in this position. He thinks it doubtful if the pubes can move far or separate laterally while the sacro-iliac joints are intact.

Mangiagalli had observed, in twenty-eight cases of deformed pelvis, spontaneous delivery in eighteen by the use of this posture.

La Torre urged the claim of the Italian obstetrician Mercurio for priority, as he had described this posture in 1595.

Calderini drew attention to the fact that while Walcher's position enlarges the entrance of the pelvis at the brim, the ordinary lithotomy position is better for the later stages of delivery.

OPHTHALMOLOGY.

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Pneumococcus Conjunctivitis.—JUNIUS (Konigsberg) reports a bacteriological study of an epidemic of acute catarrhal conjunctivitis. A similar epidemic the year before had at first been supposed to be one of trachoma, but, the cases having all recovered in two or three weeks under treatment, it was evidently not of that character. In the later epidemic, therefore, cultures were made upon blood-serum and glycerin from sixty cases. These showed that forty-nine cases—thirty-six in children under sixteen years and thirteen in older persons—were cases of pneumococcus infection. In thirty-one cases the pneumococcus of Fränkel and Weichselbaum was obtained in pure culture. In eighteen cases the pneumococcus was mixed with staphylococci and so-called xerosis bacilli.

The disease commonly began in one eye, the other becoming infected from one to eight days later. In only three cases was it confined to one eye. It began with lachrymation, and by the second day there was marked conjunctival hyperæmia. Quite a characteristic symptom was the appearance, on the second or third day of the disease, or sometimes later, of small hemorrhages in the bulbar conjunctiva. Phlyctenules were not noticed in any case during the acute disease, and in only one case was there any corneal complication.

The treatment employed consisted in the use of a solution of mercury oxycyanide, 1 : 5000, as a collyrium; dusting calomel into the eye; and, later, touching the lids with a 1 per cent. solution of silver nitrate. Under this treatment recovery took place in about two weeks.—*Zeitschrift für Augenheilk.*, January, 1899.

H. GIFFORD, of Omaha, has no reason to change the opinion, expressed two years ago, that in that vicinity this germ is by far the most frequent cause of acute catarrhal conjunctivitis; and since using serum-agar almost exclusively for primary cultures from the eye he has come to realize that it is of vastly more importance in all sorts of infections than he formerly believed. Serum cultures must be made if this germ is to be detected with anything like the frequency with which it really occurs. On agar it sometimes does not grow at all, or with such slight vitality that its presence is effectually concealed by the numerous colonies of other germs.

He calls attention to the effects of chloride of zinc upon cases of pneumococcus conjunctivitis. The simple instillation of a one-fifth of a 1 per cent. solution of this salt generally causes the pneumococci to disappear from the sac with astonishing rapidity; and if the upper lid be everted so as to bring the remedy into the upper retrotarsal fold as well as the lower a few applications almost always cure the worst cases.—*Archives of Ophthalmology*, November, 1898.

Bacteria in the Normal Conjunctiva.—ARNOLD LAWSON (London) reports on cultures made from the healthy conjunctiva in 200 cases. The sterilized platinum loop was rubbed over the conjunctiva and then used to inoculate Loeffler's blood-serum. No growth occurred in forty-one of the tubes. Of the 159 that showed a growth, 118 showed the presence of the "xerosis bacillus," and ninety of them were pure cultures. The others contained pyogenic cocci, staphylococci pyogenes albus, and other bacteria that caused no disturbance in the conjunctiva of the rabbit or guinea-pig. Lawson concludes that the so-called xerosis bacillus has no connection with the disease for which it has been named, but that it is an inhabitant of the normal conjunctiva, having been overlooked heretofore on account of the difficulty of growing it on anything except blood-serum.—*British Medical Journal*, August 20, 1898.

[Other observers have also noted the frequency with which this bacillus is encountered in the conjunctival sac. Its presence there is of the greatest practical importance, because of its very close resemblance to the Klebs-Loeffler diphtheria bacillus and pseudo-diphtheria bacillus of Hoffmann. Morphologically they are indistinguishable, and their cultures are not fully characteristic. Inoculation of the guinea-pig seems to be the only conclusive test, the "xerosis bacillus" being non-pathogenic. It is more than likely that some of the cases reported as diphtheria of the conjunctiva, without the characteristic symptoms, are merely instances in which the "xerosis bacillus" was found in searching for the evidence of diphtheria.—ED.]

Operative Treatment of High Myopia.—ROGMAN (Gand) reports twenty-one extractions of the transparent crystalline lens for high myopia in twenty patients. In the one case in which both eyes were operated upon fourteen months elapsed between the operations. One patient was sixty-five years old, and his lens was removed by simple extraction. The ages of the others ranged from fourteen to thirty-eight years, and in them the removal of the lens was effected by a preliminary discission (a second preliminary discission was done in two cases), followed in from four to fourteen days by extraction of the lens substance by the suction curette of Teale. The suction operation permits the complete extraction of the lens through a relatively small corneal incision, and diminishes the necessity for secondary discissions. Rogman carefully avoids rupture of the posterior capsule and hyaloid membrane, if possible. Discission of the capsule for secondary cataract was done in but six cases. Detachment of the retina occurred in one case nine months after removal of the lens. Cyclitis appeared in one case, but did no serious damage.

Visual acuteness with correcting lenses was improved in every case except one, and in several cases was doubled or more than doubled. The lowest degree of myopia for which the operation was done required —14.◯—2.5 Cy. to correct it, and the highest 30 D. The change in refraction caused by the operation varied from 16 to 26 D. In eleven cases it was either 19 or 20 D. Ten cases were seen as much as nine months after the operation, the time at which the one detachment of the retina occurred. Changes in refraction after the operation are not mentioned.

O. SCHEFFELS (Krefeld) reports ten cases, watched for periods varying from two to four and one-half years, to determine the ultimate results of operation. In six cases, besides the increase of visual acuity, manifested shortly after the operation, there was a progressive improvement, which continued for some years. In six of the cases in which, after the completion of the operation, the pupil was perfectly clear there developed, after intervals of three months to four years, a secondary cataract. In eight of the ten cases the hyperopia, obtained soon after the removal of the lens, subsequently decreased. In three cases in which only one eye was operated on the myopia had continued to increase in the other eye. In spite of such continued distention of the eyeball, Scheffels believes the operation is indicated if it in no way injures the eye, since it increases the patient's ability to work.—*Klin. Monatsbl. f. Augenheilk.*, November, 1898.

SCHRADER, in a critical review of the whole subject, finds that the proportion of cases of detachment of the retina is not very different after removal of the lens from the proportion occurring among myopes of the same grade who have not had the lens removed; but he points out that the patients operated on are younger, and therefore retinal detachment should be more rare. Thus, from 60 to 85 per cent. are under twenty-five years of age, and among such myopes, according to Fröhlich, detachment of the retina occurred in but 1.25 per cent. of cases, while after removal of the lens it occurred in 3.3 per cent.—*Zeitsch. f. Augenheilk.*, January, 1899.

[The earlier enthusiastic reports upon removal of the lens for high myopia have been so manifestly deficient in detail and exactness as to be practically worthless in any effort to determine the real value or dangers of the operation. The reports above quoted are of a different character, and help to indicate the real value of the operation. It will be noticed that they are not based on such large numbers of cases as the earlier reporters claimed to have believed. In this connection it should be noted that English and

American operators have reported not more than two or three cases apiece. Nayes, Wilmer, and Sattler each reported one case (*Trans. Amer. Ophthalmol. Soc.*, 1898), and in discussing them Bull said that among 347 cases of myopia of over 12 D. he had seen but three for which the operation was advisable. Fuchs, too (*Wiener klin. Woch.*, February 9, 1899), reports five cases, and among over 18,000 patients seen last year met but ten in which removal of the lens for high myopia was indicated.—Ed.]

Entropion of the Lower Lid.—S. Theobald (Baltimore) recommends the use of caustic potash in the treatment of senile entropion from relaxation of the tissues of the lower lid and for some cases of entropion due to trachoma. Before cauterizing the lid is soaked for ten or fifteen minutes in a strong solution of cocaine. This lessens but does not entirely annul the pain. The crayon of caustic is sharpened by rubbing on wet blotting-paper. The aim is to produce an eschar, 3 or 4 mm. wide, extending the whole length of the tarsus parallel to the margin, but nowhere nearer to it than 2 mm.

The lid being everted and put upon the stretch, the crayon is drawn back and forth along the line about 4 mm. from the lid border until the epidermis is destroyed and the tissues beneath begin to assume a brownish color. When the action of the caustic has extended sufficiently it is checked by the application of an acid solution, as diluted vinegar. Within a few minutes the eschar begins to contract, and when the lid is released it is usually found that the tendency to entropion has been already overcome. No dressing is necessary. The soreness and tumefaction soon disappear, and after a few weeks all traces of the eschar have faded away, and it is usually not possible to detect that any operation has been performed.—*Trans. Amer. Ophthalmol. Soc.*, 1898.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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The Changes Produced in Epithelium by Moderate Degrees of Heat and Cold.—Fuerst (*Beiträge zur path. Anatomie*, 1898, xxiv. 3) reports the results of his further study of the changes produced in the epidermis by moderate degrees of heat and cold. He experimented chiefly on the ears of guinea-pigs and rabbits, using an ether spray to freeze them slightly, or water at a temperature of about 50° C. to test the effect of heat.

He sums up his results as follows:

1. The effect of slight heat and cold lasting for a short time and frequently

repeated is to produce in man and mammals a thickening of the epidermis up to eight times the normal condition, caused chiefly by enormous increase in the size of the separate cells, and secondarily by an increased new formation of them.

2. The corium is for the most part unaffected; the changes in the vessels are limited to hyperæmia; exudation is lacking.

3. Many large giant-cells make their appearance in the epithelium of the external skin and of the mucous membrane, and also in the epithelium of the milk and sebaceous glands.

4. The giant-cells arise wholly from single cells through multiple, direct division of the nuclei.

5. The first beginnings of giant-cells are evident in four to five hours. In ten to twelve hours they are fully developed.

6. In the guinea-pig, regeneration of an injury produced after exposure of the tissue to the irritation of heat or cold takes place three times as rapidly as normally.

7. The degree of the heat used as an irritant can be gradually increased within certain limits without danger, because the tissues adapt themselves to it, and there occurs a relative immunity.

8. Slight chemical irritants (dilute cantharidin, etc.) produce similar evidences of proliferation, but no giant-cells are formed.

9. *Cause of the Proliferation* The hypertrophic and hyperplastic processes are probably not due to the formative effect of the thermal or chemical irritant, but rather occur in consequence of the primary tissue lesions, and represent an excessive regeneration.

10. *Cause of the Giant-cells.* The effect of the slight cold is to injure particularly the protoplasm and to leave the nucleus practically intact. This lesion of the protoplasm is at first only functional, and stimulates the nucleus. The effect of the lesion is to remove all hindrance to the growth of the nucleus, which is thus enabled to develop untrammelled its boundless powers of proliferation.

11. *Cause of the Direct Division.* The direct division of the nucleus is to be regarded as a vicarious function due to inability, in consequence of the injury to the cell-body, to incite the karyokinetic process.

12. *Special Result for Human Pathology.* The increased power of regeneration which has been partly proved for man, and partly has been made very probable, deserves careful trial in clinical surgery with reference to its future use at the bedside.

The Influence of Different Substances upon the Red Blood-Corpuscles, and the Importance of the Latter in Coagulation.—Feldbausch (*Virchow's Archiv*, 1899, clv.) has confirmed Arnold's observations on the morphological changes of the red blood-corpuscles in blood undergoing coagulation. He concurs in the opinion, advanced by Mosso some years ago, and supported by Wlassow and Arnold, that the red blood-corpuscles play the chief part in coagulation, and that the blood platelets are nothing but broken-down red blood-corpuscles.

Feldbausch used Arnold's method of examining the blood. This consists in employing extremely thin sections of elder pith, which are fixed to the cover-slip with a drop of a mixture of blood and 10 per cent. potassium iodide solution. This is then surrounded with a rim of vaseline and mounted upon a hollowed object-glass. The red blood-corpuscles in the fine capillary spaces of the elder pith are better protected from the mechanical influences of the glass than in a simple hanging-drop preparation. It has the additional advantage of permitting the examination of a very thin layer of fluid, so that one can study the structural alterations, both in the fresh and hardened preparations, with the highest powers of the microscope.

Arnold observed great changes in the red blood-corpuscles. They lost their biconcave form and showed great differences in shape. Some were thickly beset with small, delicate, pointed prominences; others had only a few blunt projections; others, again, possessed knob-like processes, often joined to the erythrocyte only by fine threads. Finally these detached themselves completely and swam about freely in the plasma, where they underwent still further fragmentation.

The internal structure of the red blood-corpuscles also showed essential differences. Some presented a homogeneous appearance, but the majority showed a distinct granule formation. The granules were in lively motion. Feldbausch's investigations suggest to him the possibility of this being a vital phenomenon.

Feldbausch found that in a mixture of blood and sodium chloride solution variations in concentration of the latter influenced the time and extent of coagulation. With the appearance of coagulation, definite changes, similar to those described by Arnold, are seen in the red blood-corpuscles, so that an intimate relation between the two seems a reasonable conclusion.

In solutions which retard coagulation, especially an infusion of leeches, changes always occur in red blood-corpuscles which differ in the extent and rapidity of their appearance according to the coagulation-checking power of the solution used. This emphasizes further not only the connection of red blood-corpuscles with clot formation, but the important part they play in the process.

Typhoidal Pleurisy.—ACHARD (*La Semaine Médicale*, October 19, 1898) reports two cases of pleuritis occurring in the course of typhoid fever, in which the typhoid bacillus was obtained in pure culture from the aspirated fluid. In one case the fluid was serous; in the other sero-sanguinolent, later becoming purulent. The agglutinating power of the pleuritic fluid was ten times that of the patient's blood.

[The writer does not state the tests made to establish the identity of the micro-organism in these cases. That the agglutinating power of the fluid was so great is interesting in view of the statement of some investigators that exudates in which the typhoid bacillus is present lose the power of agglutination.]

Colon Bacilli Reacting to Serum of Typhoid Fever Patients.—SMITH and TENNANT (*British Medical Journal*, January 28, 1899), in their study of the recent typhoid fever epidemic in Belfast, obtained varieties of the bacillus coli which were clumped by the serum of typhoid patients. A dilution of 1 : 100 was used, and a period of two hours allowed for the test. The bacilli were isolated from the water-supply of Belfast and from the spleen of a typhoid patient. When compared to the classical type of the bacillus coli they all conform in general to the accepted description of the bacillus. They differed from many races of bacillus coli in that they possess a high motility and in more rapid gas and indol production.

Cases of typhoid fever in Lurgan and Dublin were also studied, but no differences were discovered in the nature of the infection in these three localities.

A number of cases when first examined gave a clear reaction to the bacillus coli group alone. At a later period they showed a distinct power of agglutinating the bacillus typhosus also. The supposition is that the reaction of the bacillus coli in such cases is due to some process of infection for which it itself is responsible.

Their observations and experiments lead them to the conclusion that the colon bacillus as well as the typhoid bacillus is concerned in the production of typhoid fever.

[It does not seem that the facts presented justify the sweeping generalization that typhoid fever is essentially a mixed infection.]

Transitory Glycosuria in Diphtheria.—HIBBARD and MORRISSEY (*Journal of Experimental Medicine*, January, 1899) report the results of the examination of 1000 urines by both Fehling's test and the phenylhydrazin test. In 230 cases examined by Fehling's test a reaction was noted in 25 per cent. of all cases; in those that recovered it was obtained in 19 per cent.; and in the fatal cases in 77 per cent. In cases without false membrane no reaction was obtained.

In a second series of ninety-six cases a positive reaction was obtained in thirty-three cases by both tests.

In ninety-three cases of scarlet fever a positive reaction occurred in fifteen. Of thirty-six cases of scarlet fever and diphtheria combined, eleven gave a positive reaction. Nine cases of measles examined gave a negative result. In sixty-eight cases of simple tonsillitis a positive reaction was obtained but once.

The glycosuria was often associated with albuminuria. A certain number of cases were examined before and after the injection of antitoxin, and it was found that for a few days after the injection a slight glycosuria sometimes occurred.

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A STUDY OF MULTIPLE-METASTATIC ANGIOSARCOMA.

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Cohnheim[6] defines tumor tissue to be an atypical new formation starting in a latent embryonic rudiment. The tumor germs consist of embryonic cells, and it is only when they are favored by external conditions, such as supply of nutriment and their relation to surrounding parts, that they begin to multiply and form a tumor.

Senn[6] says that sarcoma tissue is produced from the matrix of embryonic tissue-cells of congenital or post-natal origin. He describes angiosarcoma as usually of a more or less tuberous structure. Its consistence varies from that of a jelly-like mass to the density of a cartilage. On section the surface presents an alveolar structure, but seldom regularly. In addition there is great vascularity; occasional blood-cysts and hemorrhages impart a variegated appearance. Under the microscope angiosarcoma presents a reticular, seldom alveolar, structure; the cells are arranged in the form of strands corresponding to the bloodvessels. If the vessels do not contain blood the tumor simulates carcinoma. The cells are epithelioid in shape, are normally multinuclear, often show prolongations, and their margins are not as sharply defined from the ground-substance as in carcinoma. The ground-substance is composed of connective tissue in any of its varieties; vessels are numerous, large, and always capillary, and the intercellular tissue is scanty, imparting to the structure an angiomatous appearance. Angiosarcoma is rare, and is most frequently found in the head. The growth of the tumor is slow, but recurrence is rapid. In five out of sixty cases[6] the tumor gave rise to metastasis.

For the diagnosis of neoplasms of the orbit, Swanzy[33] emphasizes the following points: Exophthalmos, palpation, derangement of vision, pain, loss of motility, pulsation, and the consistence of the tumor. Jacqs[33] gives an additional sign—the souffle which is produced by pressure of the ophthalmic artery on the branches of the dilated ophthalmic veins. A diagnosis of orbital tumor is possible only when the growth has reached sufficient development to show a number of the signs above enumerated; and if the primary tumor be of a malignant nature, particularly of the metastatic form, and especially of the angiotic variety, neither a diagnosis nor an operation can be made sufficiently early to insure the life of the patient, as by this time the tumor is too fully developed and has already sent forth its branches or its seeds into other structures or organs, from derangement of which death ensues. Our own experience with these growths, as well as a perusal of the literature, proves to us that sarcoma of the orbit is necessarily fatal, no matter what or how many operations be done to remove the primary focus of the disease.

In a case[41] of metastatic sarcoma originating in the orbit coming under Würdemann's observation the eyeball had been enucleated for "inflammation" three months before by another physician. Neither the patient nor the family were made aware of the malignant nature of the disease until a tumor appeared in the orbit; so the eyeball was probably neither examined nor a diagnosis made. Würdemann removed the entire contents of the orbit. Microscopical examination showed the tumor to be a small, round-celled sarcoma, the cut edges of the optic nerve being infiltrated. Recurrence in the orbit did not take place for three years. About two years after the original operation the liver was found to be enlarged, and, later, metastatic sarcomata appeared in other internal organs of the body and in the skin in different localities, the liver becoming of enormous size, the patient dying of metastatic tumor of the brain three and one-half years after the exenteration.

Dalziel[13] has operated seven times in one case for recurrent sarcoma originating in the orbit, giving rise to secondary growths in the cheek, over the mastoid, in the upper lip, in the superior maxilla, and in the pterygoid processes. The orbital contents were removed four years previously for primary sarcoma of the lachrymal gland. The last operation had been done fifteen months before his report was made, and there had been no recurrence since. Sarcomatous tissue of the small round-celled variety was found. There was no evidence of visceral lesions.

Stirling[32] reports several cases of sarcoma of the orbit, and emphasizes the importance of an early diagnosis and thorough operation, having some of the cases under obervation four and one-half years after the operation in which there is no return of the tumor growth.

Despite favorable reports of this nature, it may be accepted as a truism that if cases of orbital sarcoma be watched long enough the neoplasm will be found to have returned in either the original situation or some other part of the body. Experience and the literature show that if metastasis occurs when the orbit is affected by sarcoma it is usually the visceral organs that become affected. It seems likewise true that, if the orbit be implicated in general metastatic sarcoma, this region is the original place involved, and the disease of other organs is caused through metastasis.

Stirling[32] shows that sarcoma affects both the uveal tract and the orbit in males and females in about equal proportions. The average age in uveal sarcoma is forty-eight and one-half years, and in primary orbital cases the growth first appeared, on the average, at twenty-eight and one-sixth years. There is but little tendency for one side to be affected more frequently than the other. In only four cases out of 103 was there history of tumors in near relatives. In three out of seven cases that recurred there were metastatic growths. Recurrence took place locally from a few weeks to three years after operation. In every case in which recurrence took place the patient died of sarcoma. In the primary orbital cases recurrence was reported to have occurred in 58.6 per cent. The average time elapsing between operation and recurrence was twenty months. Stirling's results show a difference between growths primarily affecting the uveal tract and those beginning in the orbit. In the former 8.86 per cent. recurred in the region of the orbit, and death in 32.9 per cent. was due to metastasis. In the latter, when recurrence took place at all, the orbit was always affected, even when other organs were attacked. Stirling concludes that it is probably less dangerous to have uveal sarcoma than a sarcoma of the orbit.

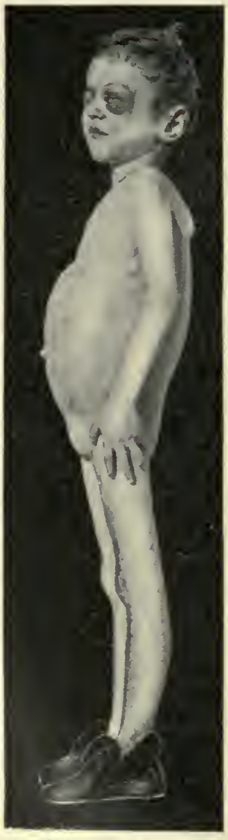
The authors have recently had the opportunity to observe a case of multiple angiosarcoma with wide-spread metastasis and infiltration into various organs. The case was seen in its incipiency, was carefully studied during its entire course, and a complete post-mortem examination of the diseased tissues was made.

J. McG., female, aged five years and seven months, a child of Irish-American parents, was referred to Dr. H. V. Würdemann, October 18, 1897, by Dr. E. J. Kelley, on account of left-sided exophthalmos, due to a tumor in the orbit. The sight on both sides was apparently normal. The left eye, although directed downward and outward, was voluntarily movable in all directions.

Family History. Grandfather on paternal side died of old age. Grandmother still alive. Father's health has always been good. No tubercular or carcinomatous history on his side. Grandfather on maternal side died of cancer of the stomach. Grandmother died in childbirth. Mother's health has been good until recently, when she has suffered from nervous dyspepsia and neurasthenia. Commenced to menstruate at fifteen years of age; she has had eight children; her labors have been easy; one miscarriage occurred at seven months. One child died of malnutrition at less than one year of age; the others are living. One boy, sixteen years old, had spinal meningitis at four years of age, leaving curvature of the spine. One boy, fourteen years of age, had supposed tubercular disease of the knee-joint. The limb is now deformed. The other children are healthy, except the one whose case is here reported.

Personal History. The child was delivered by Dr. S. W. French, the labor being easy; the infant was apparently normal; raised partly by wet nurse and partly by bottle. She had no illness other than usual indispositions of infancy, and was not ill during early childhood up to this time. September 10, 1897, the left eye was observed to be diverging and slightly protruding. The general condition before this time had been good, but about this time she suffered from indigestion, which was followed by malnutrition.

FIG. 1.



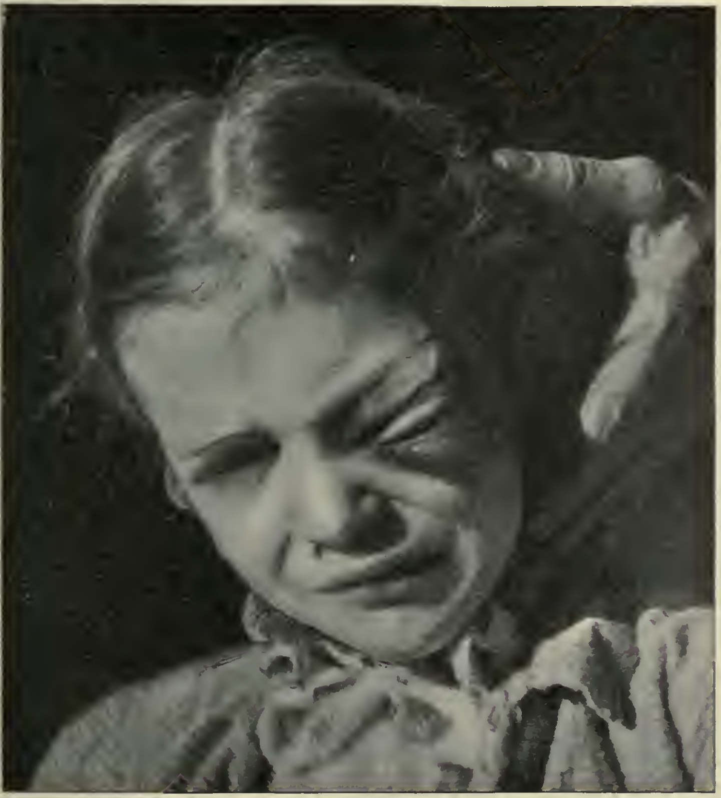
Condition of patient January 1, 1898.

October 18, 1897, she was brought to the office by Dr. E. J. Kelley, he having seen her a few days before. The child weighed about forty pounds, was anæmic and poorly nourished. There was exophthalmos of the left eye, with protrusion downward and outward. An irregular growth was felt, which evidently proceeded from the upper and inner angle of the orbit; this was movable, slightly nodulated, and gave evidence of fluctuation. There was some little ecchymosis of the upper lid. There was a history of indigestion and intestinal trouble during the last month, probably caused by the diet allowed, for when placed in the hospital on a good, wholesome diet this disappeared. Ophthalmoscopic examination showed nothing abnormal beyond congested retinal veins in the left eye. The vision was not obtained, owing to the child's ignorance. General examination by palpation, percussion, and auscultation revealed nothing abnormal.

20th. She was taken to the Milwaukee Hospital, and, with the assistance of Drs. E. J. Kelley, N. M. Black, and Edward Schulz, the growth was removed by Dr. H. V. Würdemann under chloroform anæsthesia. An incision was made through the fold of the upper lid, the fibres of the elevator caught with a thread, and reunited after removal of the growth. The tumor seemed to originate from the orbital portion of the frontal bone, was subperiosteal, and extended back and outward from the margin of the orbit about 20 mm. It was of a dark color, cystic, and friable in character, and broke down in the removal. It contained a blackish fluid mingled with débris of degeneration. Denuded bone was exposed by the probe. All of the growth was removed, the surrounding parts curetted, and tube drainage inserted. The wound healed rapidly, and in two weeks the eye regained its normal appearance and position. The exophthalmos and strabismus entirely disappeared. Microscopical examination showed the growth to be a nuclear neoplasm, probably a sarcoma.

December 10*th*. The child was again brought to the office by Dr. E. J. Kelley, with the eye protruding even more than when first seen, with an enlargement at the left temporal prominence and one in the upper temporal portion of the right parietal bone. The right hypogastrium protruded, and on physical examination a tumor was found in this region, which at the time was believed to be a metastatic growth in the liver. She was reduced in weight, and had a decided cachectic look. Neither eyeball was inflamed, and, as far as we could judge, there were

FIG. 2.



Condition of patient January 1, 1898.

no purely ocular symptoms, except exophthalmos and a bruit, appreciable by the stethoscope when applied over the eye. The vision of both eyes was seemingly the same. Ophthalmoscopic examination was negative in the right eye; in the left tortuosity of retinal veins was seen. No history of diplopia was obtained. An unfavorable prognosis was given, and the parents were told that the tumors were inoperable and advised to send the child to the Milwaukee Children's Hospital. This advice was not followed until December 24th, when Dr. Würdemann was called to the house, where he found the child in a deplorable condition, not having been able to retain any food for nearly a week.

25th. The patient was taken to the Milwaukee Children's Hospital. Weight about thirty pounds; pulse 120; temperature 99.6°. She was put upon rectal feeding with peptonized milk, three ounces every four hours, preceded by copious injections of sterilized water. Absolutely no food was given by mouth until December 28th. Pulse decreased to 100; temperature to normal. She was kept in bed for two days; on the 28th, dressed and allowed to sit up. Was most comfortable curled up in a large chair or sitting on haunches on the floor. The mental condition was that of an average child. The weight on December 27th was thirty and one-half pounds. The blood-count showed the proportion of white corpuscles to the red normal, the red being lowered in number (3,500,000); hæmoglobin 80 per cent.; urine normal.

30th. Iodide of potash, 0.30 gramme three times a day, in milk, was given and kept up for a month. All nourishment was taken by the mouth, and there was a gradual improvement in appearance and general health, although there was gradual enlargement of the tumors.

January 1, 1898. The temperature varied from 98° to 99.5°; pulse 100 to 120; respirations 25.

3d. Muscular cramps appeared in both legs, coming on at intervals during three days, but these gradually disappeared. During the remainder of the month the patient was up and dressed. Complained of no pain or irritation from the light, and could see with the affected eye. Noticed everything going on around her; sat in same position above mentioned; had a good appetite, being on general diet.

February 10th. Her weight was thirty-two pounds, the increase in weight being largely due to the increase of the abdominal tumor. The abdomen was very much distended; the arms and legs very thin. She still noticed everything going on about her; played with her dolls, and could walk. She refused solid food, but would take milk and ice-cream in small quantities. Vomited easily, food coming up unchanged. Irritation of skin of abdomen. The left eyeball had been inflamed several days, the vitreous first becoming turbid, then the cornea opaque, and speedily softening, due to lessening of the nutrition from pressure of the tumor. From this time on an occlusive dressing, moistened with 25 per cent. glycerin solution, was kept on the eye.

12th. Was much weaker, remaining in bed. Most comfortable when lying on the left side, curled up, with the head nearly to the knees. Temperature 98° to 99°; pulse gradually increased, 120 to 130. Great increase in tumors.

17th. Weight thirty-three and one-quarter pounds, due to increase of abdominal growth.

19th. Very much weaker; noticed but little, and refused food.

20th. Took food by mouth, eating meat, drinking milk, and playing with dolls. Gradual decrease of vitality. Mental condition unchanged. Pulse regular and steady, 120.

FIG. 3.

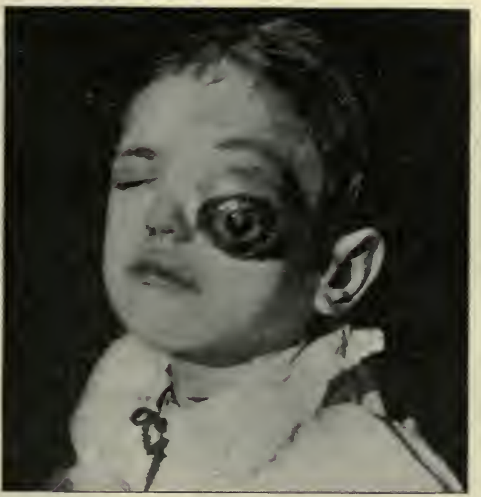
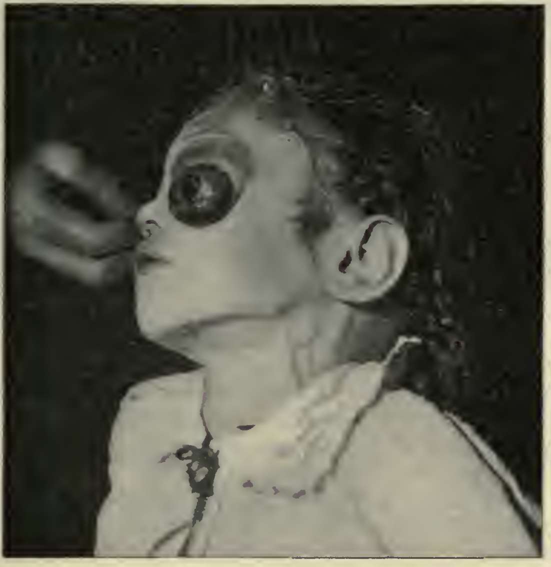


FIG. 4.



Condition of patient February 10, 1898, showing implication of the cervical lymphatic glands.

23*d.* Slept well previous night, no pain, and took nourishment. Mental condition unchanged; asked for milk and bread and to go down-stairs. After a bath was tired, and said she would rather remain in bed. 9.30 A.M. direct change came. Lapsed into unconsciousness, breathed shortly and quickly, with rattling noise in the throat. 10 A.M., breathing more quietly, pulse weaker, convulsive spasms occurred, which gradually grew weaker. Death at 11.45 A.M., February 23, 1898.

FIG. 5.

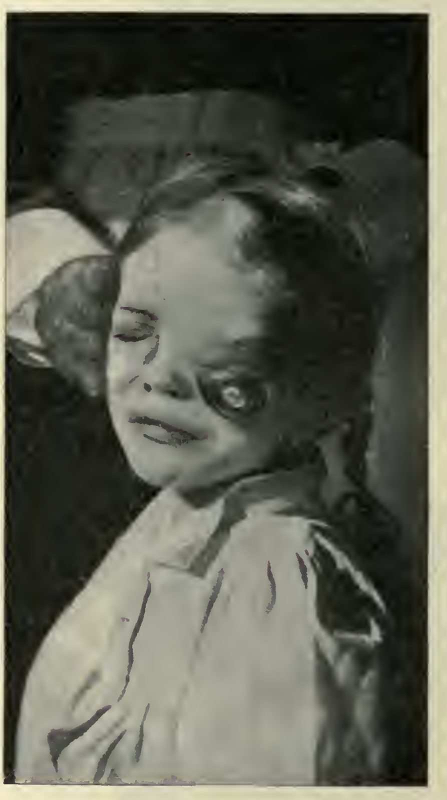
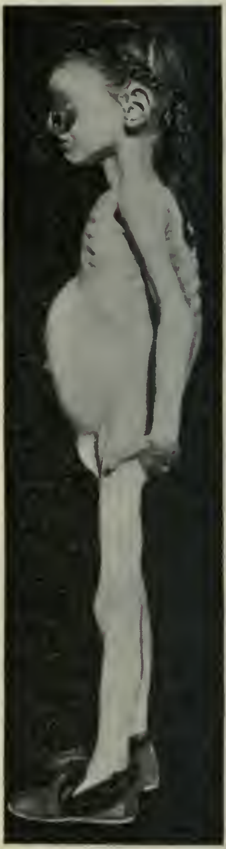


FIG. 6.



Post-mortem Examination. February 23, 1898, at 4 P.M.. post-mortem examination was made by Drs. Würdemann and Black. The case being a *cause célèbre,* a number of other physicians were present by invitation.

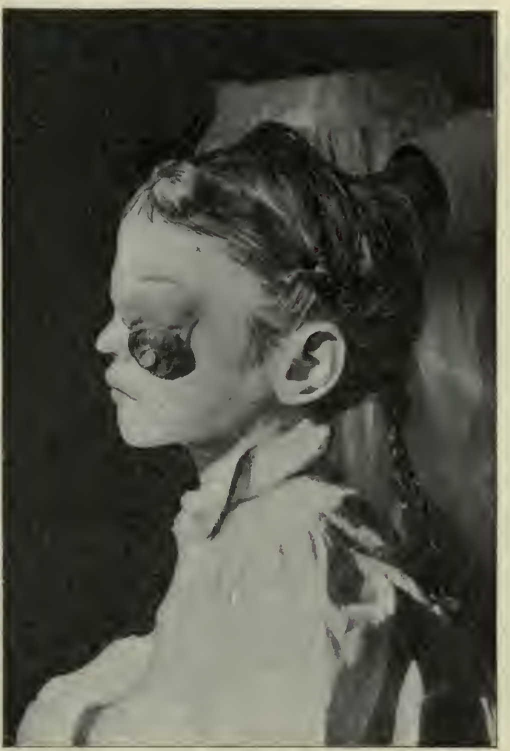
The following report of the pathological appearances has been made by Drs. N. M. Black and S. H. Friend:

External Examination. Female, aged five years, eleven months; height three feet ten inches; weight of body, thirty-five pounds. Post-mortem discolorations on neck and back. Body poorly nourished. The color of skin yellow. The arms and legs as thin as pipe stems. (Fig. 6.)

Head. A tumor the size of an egg on the left frontal prominence. Tumor about the size of an orange on right parietal bone, near the superior junction of the parietal and frontal bones. The left eye is pushed forward by a tumor, the size of a lemon, between the commissure of the lids 5 to 8 cm. (Figs. 5 and 7); the bloodvessels deeply injected and ecchymosed; the cornea and conjunctiva broken down. The lids of the right eye are ecchymosed.

Abdomen. Protruding from within the abdomen is a tumor filling a part of the right hypogastrium, the entire epigastrium, almost the entire left hypogastrium; it is about the size of a child's head (Fig. 6) Within the right hypogastrium the tumor extends as high as the fifth rib in the nipple line.

FIG. 7.



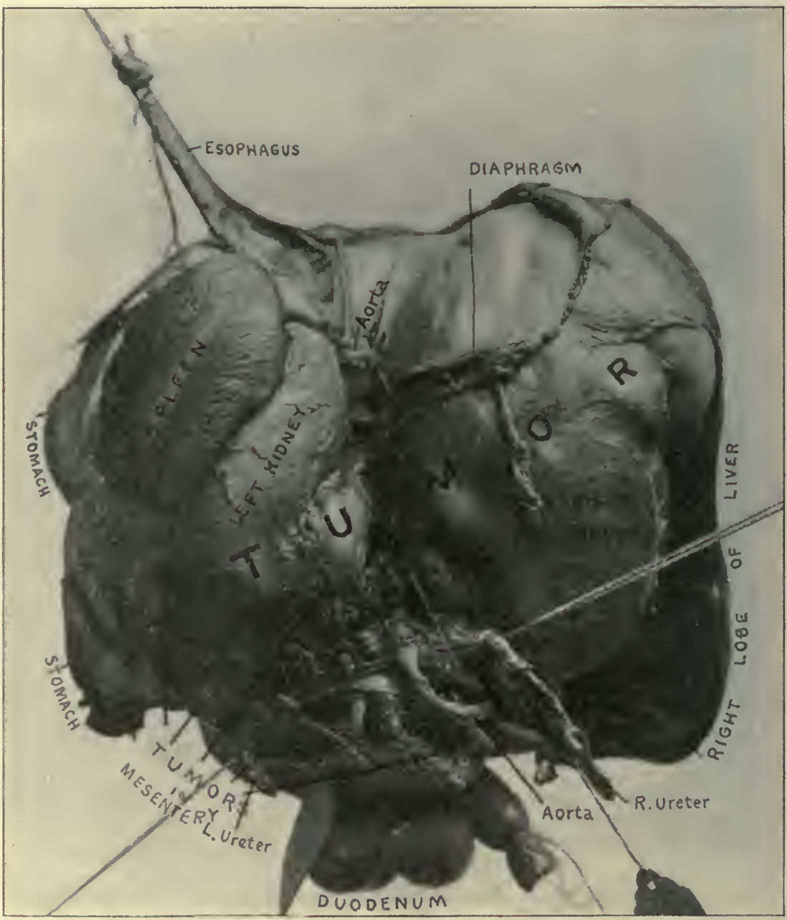
Figs. 5, 6, and 7, show the condition ot the patient February 17, 1898.

Figs. 5 and 7 show further development of the orbital and cranial tumors. Fig. 6 markedly shows the enormous increase of the abdominal tumor and the progressive emaciation.

The Thoracic Cavities. The lung, heart, and large bloodvessels show nothing abnormal. The right half of the diaphragm is pushed upward by the growth.

The Abdominal Cavity. The left kidney occupies a normal position; is of a light reddish-brown color. The capsule is non-adherent. Section of the organ shows no abnormality. Weight, seventy grammes. The right kidney lies lower than normal, embedded in an enormous mass of tumor. The tissue surrounding the kidney is firm on pressure and lobulated. The kidney is with difficulty detached from this firm mass. The superior surface of the kidney contains two indented facets produced by pressure of the surrounding growth. The surfaces of these facets are of a reddish-brown color, indicative of blood extravasation. The remainder of the kidney is of a normal color. Weight, sixty grammes. The capsule of this kidney, with the exception of the anterior portion, is involved in the growth.

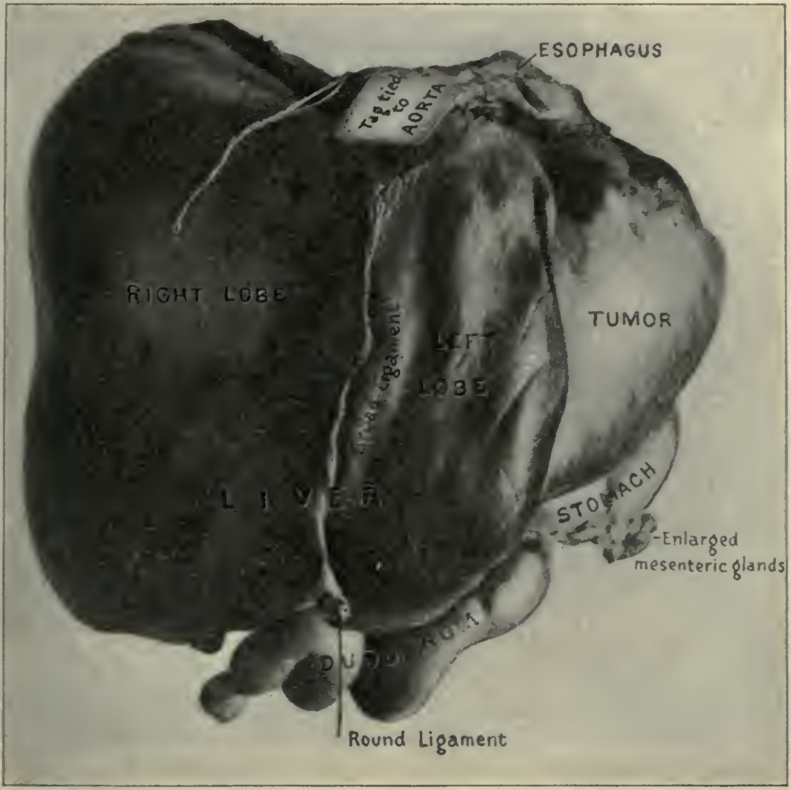
FIG. 8.



Posterior view of abdominal viscera and tumors.

The suprarenal capsule is enlarged to about ten times its normal size and tightly adherent to the neoplasm. In attempting to separate the capsule from the growth the finger entered a cavity from which a chocolate-colored blood fluid oozed. The spleen is pushed upward, yet appears normally attached. The color and consistence of the organ normal. Weight, forty-five grammes. The ilium, jejunum, and large intestines show no abnormalities. The upper border of the transverse colon lies on a level with umbilicus. The mesenteric glands are all enlarged. The pelvic organs are normal. The liver, stomach, duodenum, pancreas, and the neoplasm, with some mesenteric glands and the aorta, massed together. The liver is flattended upward against the diaphragm, pushed by the attached neoplasm. The amount of liver-tissue present is about the size of two adult hands, the outer surfaces pressed together. Its thickest portion measures about 3 cm., and from that depth tapers to 1 cm. at the edges. The weight of the liver, detached, is 450 grammes.

FIG. 9.

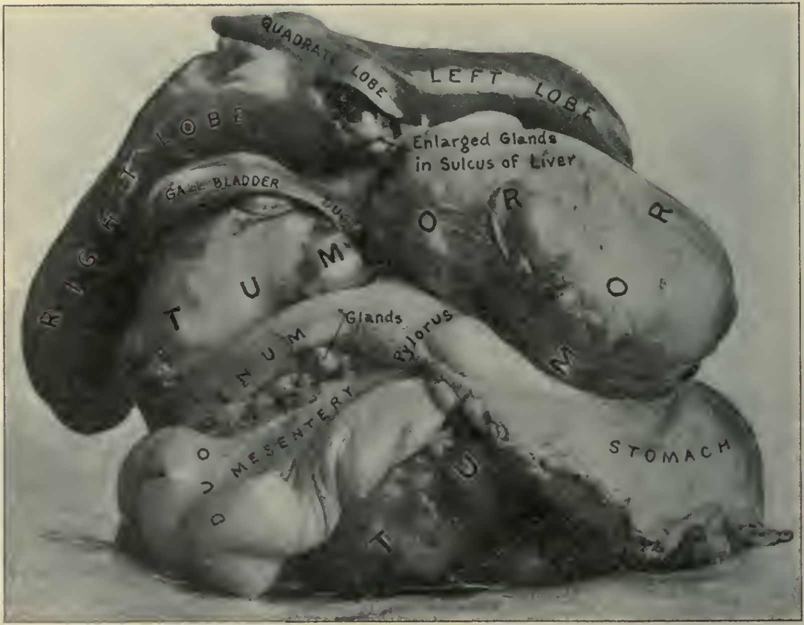


Anterior view of abdominal viscera and tumors.

The main neoplasm, covered by the peritoneum throughout its entire extent, continues into the liver. The entire neoplasm weighs 1660 grammes. The growth throughout the entire extent is lobulated; attached to 4 cm. of the posterior wall of the gall-bladder; to the superior border of the lesser curvature of the stomach; to the mesenteric border of the duodenum, and to the connective tissue surrounding the aorta. The gall-bladder contains a small quantity of grayish-colored fluid. The duct is patulous. A lobule of the neoplasm pushes the gall-bladder upward and to the right. The common duct is elongated and passes around over the anterior portion of the growth between two lobules, to reach the duodenum, and enters at the normal point, 10 cm. from the pyloric end of the stomach. The tissues of the gall-bladder are not involved.

The walls of the stomach and duodenum not thickened. The pancreas lies in its normal position, pressed upon by the neoplasm and enlarged mesenteric glands. The organ, much enlarged, weighs thirty grammes. A cyst containing a whitish semi-fluid is connected with its head.

FIG. 10.



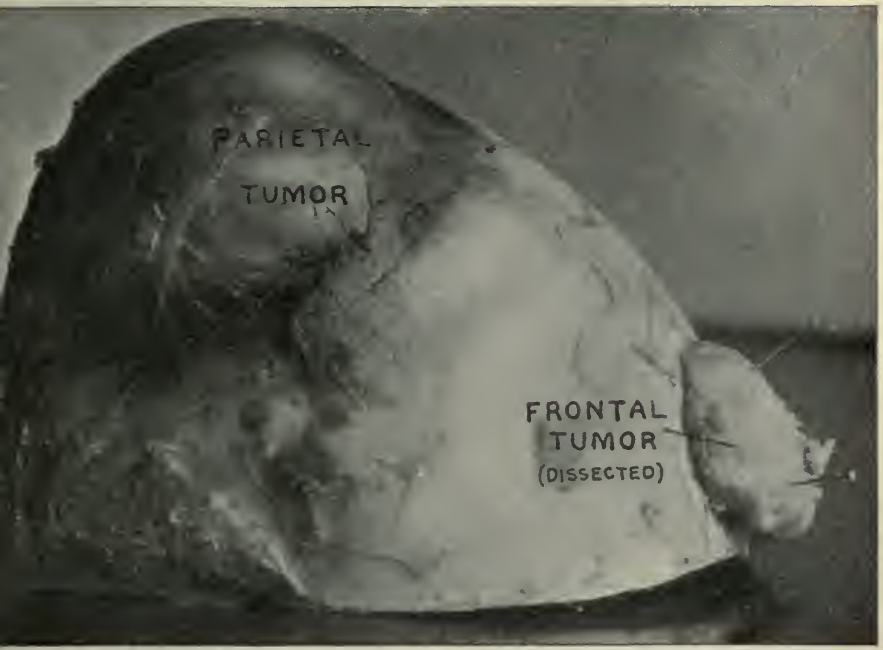
Inferior view of abdominal viscera and tumors.

The Cranial Cavity. On reflecting the scalp from the skull the tumor on the left frontal prominence is found firmly attached to the scalp. The tumor, of a whitish color, is also firmly attached to the bone. The periosteum is destroyed. The tumor on the right parietal bone is of a reddish-brown color, contains blood, and is covered by the periosteum. (Fig. 11.)

The calvarium was removed with difficulty, as firm adhesions were present. Both tumors are attached to the outer surface of the dura. The tumors at the surfaces indicated have destroyed the bone tissue. The outer layer of the dura mater is thickened, and grown to it are parts of the tumors, corresponding to the location of the calvarium tumors. The inner layer of the dura is smooth, glistening, and not involved. (Fig. 12.)

The superior, lateral, and posterior surfaces of the cerebral hemispheres are symmetrical in shape; the convolutions rather large. At the anterior base the gyrus rectus, lobus olfactorius, and gyrus frontalis inferior are destroyed and softened on the left side as far as the fissure of Sylvius and 2.5 cm. into the frontal lobe. The gyrus rectus and lobus olfactorius are pushed aside and partially destroyed on the right side. A tumor is firmly attached to and involves the roof of the left orbit and dura mater. The tumor is of a reddish-black color at the upper parts and a dirty white at the base; it measures 2.5 cm. in height, 6 cm. in length, and 3.5 cm. in width, filling part of the left anterior cranial fossa, and encroaches on the median line, causing the destruction of brain matter above described. Section shows the upper part of the tumor filled with pus and blood. The remainder of the base of the brain is normal. Pia mater is glistening, the vessels not distended; it is destroyed at the base over the tumor on the left side. On section the brain-substance is found to be normal except as noted. The bones forming the floor of the left orbit are partially destroyed by the involvement of the tumor. The right eye and orbit are normal, except for extravasation of blood into the cellular tissue of the eyelids. A grayish-white tumor, the size of a walnut, fills the orbit and surrounds the left eyeball; the sclerotic and retinal tissue is thickened; the optic nerve is enlarged. (Fig. 13.) The lachrymal gland is ten times its normal size and of reddish black color.

FIG. 11.



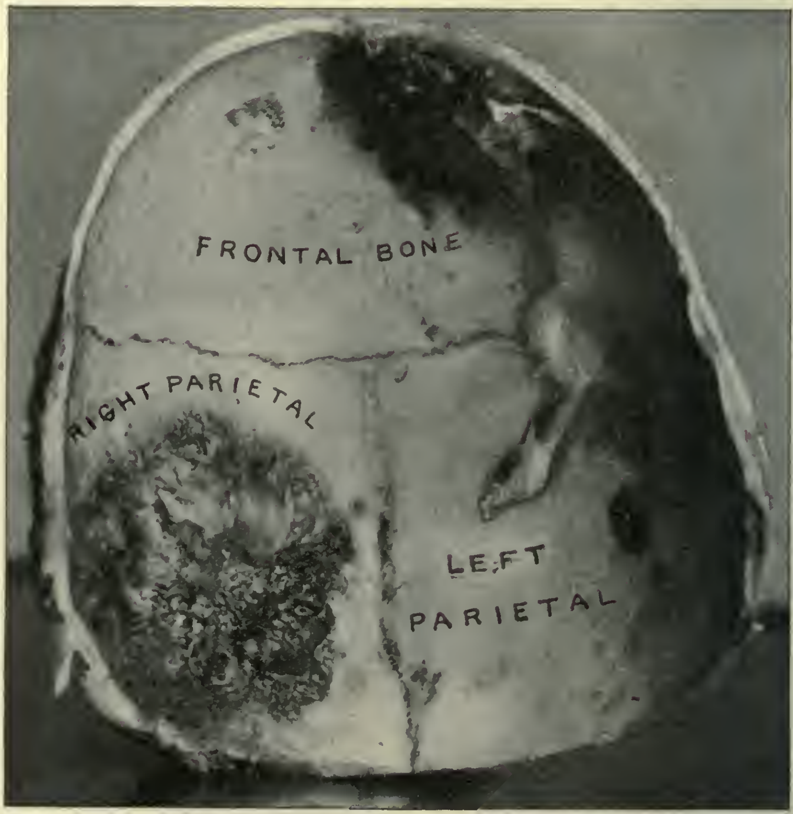
Exterior of anterior portion of cranium, showing frontal and parietal growths.

Microscopical Examination. The following report of the microscopical examination is made by Dr. S. H. Friend:

The tissues were prepared by being hardened in a formalin solution and stained with Bismarck brown. The following sections show a typical small, round-celled nuclear tumor, commonly known as angiosarcoma:

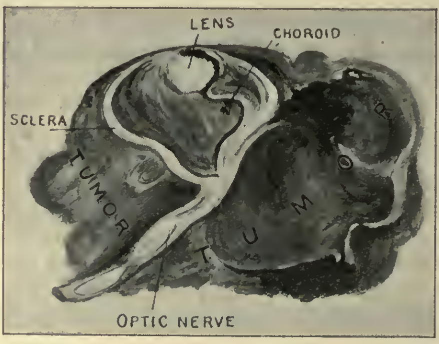
Tumors of the kidneys, liver, orbit, over frontal and parietal prominences and in brain. Kidneys, pancreas, mesenteric glands, and spleen are infiltrated with the nuclear cells. Capsule of the kidney not involved contains the cells. Areolar tissue surrounding the kidney is one

FIG. 12.



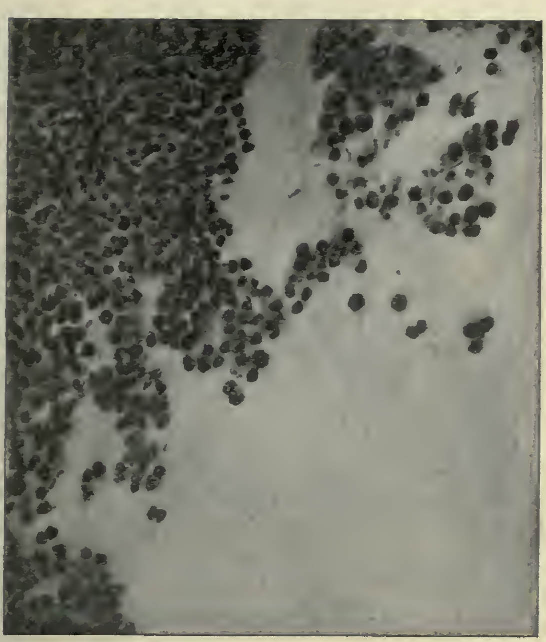
Interior of anterior portion of cranium, showing extensive destruction of bone from infiltration with tumor cells; also localized pachymeningitis.

FIG. 13.



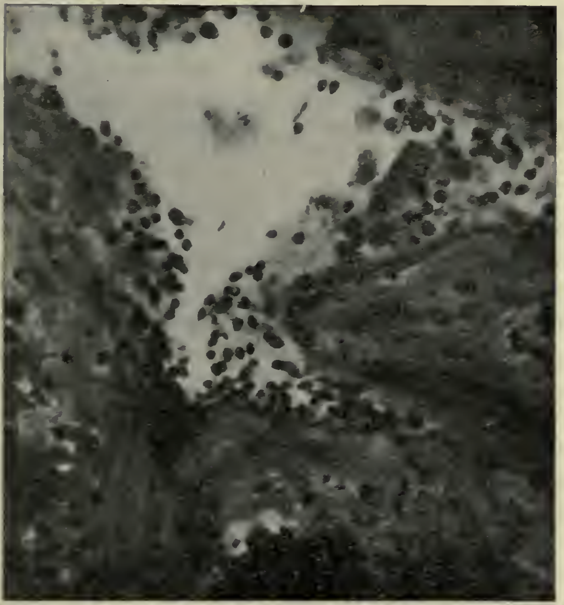
Tumor of orbit enclosing eyeball.

FIG. 14.



Microphotograph of section from orbital tumor. × 160.

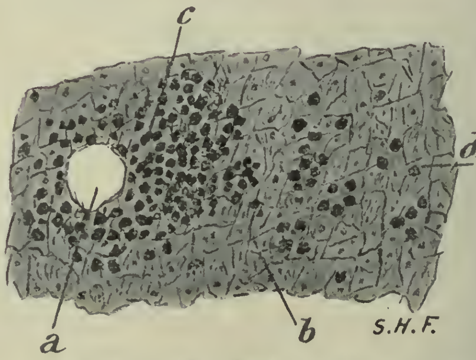
FIG. 15.



icrophotograph of section from large abdominal tumor, showing infiltration of liver. × 160.

sarcomatous mass. Suprarenal capsule infiltrated. Liver shows the gradual destruction of normal tissue by the cells. Tumor of frontal sinus is of the same general character. Sclerotic and retinal tissue is filled with the cells. The optic nerve shows an interesting process: In the fibrous sheath and myelin matter the cells are found in nests and scattered. The tumors on bones of the head are similar to those elsewhere, and the medullary substance of femur and other long bones is infiltrated.

FIG. 16.



Drawing from tissue back of right kidney. × 160.

This illustrates angiotic nature of the neoplasm. *a*. Artery. *b*. Cells of surrounding tissue. *c*. Sarcomatous cells around vessel. *d*. Eccentric sarcomatous cells.

The tumor on the left frontal prominence shows the beginning of the metastatic process. The medullary bone layer is entirely destroyed. Growing from this layer the nuclear cells are pushed outward and inward through both tables of the skull, partly destroying the bone plates.

The growth involves the periosteum and outer layer of the dura mater: (1) by the formation of lymph-glands, and (2) by the infiltration of nuclear cells. The tumors on the parietal bone and the tumor in the kidney particularly show the angiotic character of the neoplasm. (Fig. 16.)

DIAGNOSIS. The clinical evidence and reasoning from the literature of metastatic orbital sarcoma indicate that in our case the sarcomatous tissue originated in the orbit; the metastasis proceeding by means of the bloodvessels, and developing first in those tissues supplied by the portal circulation, the focus of the visceral neoplasm being in the connective tissue back of the right kidney, from which it extended by infiltration and by metastasis into the liver and other organs. The tumors of the frontal and parietal bones and within the cranial cavity were doubtless metastatic and secondary to that of the orbit. The tissues of the surrounding parts became involved through infiltration. The angiomatous nature of the new tissue favored rapid growth and metastasis, and insured the lethal termination. Microscopical examination of many prepared slides shows similar neoplasmic cells, the arrangement of which in certain portions of the tumors show that the growth is an angiosarcoma.

REMARKS. Some of the remarkable clinical points in our case were the fairly good cerebration and absence of paralysis, despite the extensive involvement of the skull and of the brain membranes; the tumor in the right anterior cerebral fossa had completely destroyed the olfactory nerve, and that of the left side of the frontal bone had seriously affected the anterior portion of the left cerebrum; the localized pachymeningitis over the motor area of the right side had given rise to no serious lesion of motility. Such a case as this almost seems to set aside our much-vaunted methods of cerebral localization. The continuance of function of the kidneys, liver, spleen, and other abdominal organs, despite the extensive involvement of other structures and the mechanical impediment to other functions from pressure of the large abdominal tumor, is indeed remarkable.

Morton[24] reports a case of primary sarcoma of the orbit which had some characteristics similar to our case as regards the lesions in the head. There was no history of traumatism; examination showed proptosis; the anterio-posterior axis of the eye was deviated outward and its motility restricted. The cornea was clear, the iris normal, the pupil small, but responsive to stimuli. There was no marked bulbar injection or chemosis. The lids were red and swollen; not much pain, but sense of fulness and discomfort. The growth was rapid and invaded the antrum, nose, ethmoidal and sphenoidal sinuses, nasopharynx, and anterior cerebral fossæ. The eyeball was removed, the patient dying within a few weeks afterward. Post-mortem examination showed that the facial sinuses were infiltrated, the horizontal plates of both superior maxillary bones eaten away; the tongue was invaded, and the entire buccal cavity on the left side was filled; the anterior plate of the antrum cavity was gone; the bony roof of the orbit was eaten away, and the tumor pressed on the frontal lobes of the brain; the tumor mass passed through the post-nasal space into the brain; the liver and other organs were normal. The microscopical examination showed an atypical cartilage rich in cells, irregularly arranged; the cells grouped closely together and mingled with round, mononucleated cells, about the size of white blood-cells. The vessels were numerous, large, and thin-walled, and in some regions the arrangement was cavernous. A diagnosis was made of chondrosarcoma. This description, however, seems to the authors more adapted to angiosarcoma.

Willoughby's case[38] had similar abdominal characteristics to ours, and although there was no orbital involvement, it may be quoted in this relation. In a young adult who had died from multiple sarcomata the necropsy showed the abdominal cavity filled with a number of rounded growths attached to the omentum, mesentery, and peritoneum, many thousand in number, varying in size from small seeds up to one large growth on the gall-bladder, about the size of a cocoanut. There were a few small nodules in the liver, otherwise the growths were confined to the serous membranes and did not extend into the organs. A secondary growth appeared in the scar in one of the paracentesis operations which had been made in the thorax; the pericardium and heart were not implicated. There were secondary growths in the loose tissue over the ribs and above the heart, and the pleuræ were covered with growths. There was slight invasion of the base of the right lung; the diaphragm was covered with growths on each surface. Microscopically the growths consisted of small round-cells. The interesting points in the case were the nearly complete restriction of the growths to the serous membranes. Particularly interesting in relation to our own cases was the non-interference of the growths with the action of the various organs, and hence the absence of many symptoms which might have been expected.

Eshner[14] reports a case of multiple sarcoma in an infant where the kidney was primarily invaded. This was attended by secondary growths in the liver. He states that renal involvement in sarcoma is more common in the first months or years of life, and may be apparent at birth. The tumor is usually unilateral with round or spindle or polymorphous cells.

References to recent literature pertinent to the subject of this article are appended.

RÉSUMÉ. When sarcomatous neoplasms are found in the orbit or adjoining cavities of the head, this region is the primary place involved in the disease, and when metastasis occurs in the abdominal cavity the visceral structures are secondarily affected. These tumors likewise infiltrate the tissues of adjacent regions.

The diagnosis of orbital sarcoma, particularly when attended by metastasis, is usually made too late to save the life of the patient by any operation. When metastasis has occurred, removal of the primary focus or of the secondary growths will not prevent recurrence, although in some instances life may be prolonged. By this time important structures have been implicated through metastasis or infiltration, the involvement of which causes death.

The angiotic form of orbital sarcoma is prone to metastasis, and is fatal from its inception.

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A CASE OF GLIOMA OF THE LOWER CERVICAL REGION OF THE SPINAL CORD PRODUCING A TOTAL TRANSVERSE LESION, IN WHICH THERE WAS SPASTICITY OF THE LOWER LIMBS AND PERSISTENCE OF THE DEEP REFLEXES.[1]

I. A STUDY OF THE TUMOR AND SOME OF THE PHENOMENA PRODUCED THEREBY.

By W. H. Hudson, M.D.,
OF LAFAYETTE, ALA.

II. A STUDY OF A PECULIAR FORM OF DEGENERATION (DEGENERATIO MICANS) MET WITH IN THIS CASE.

By Lewellys F. Barker, M.D.,
ASSOCIATE PROFESSOR OF ANATOMY, JOHNS HOPKINS UNIVERSITY.

III. SOME POINTS IN THE PATHOLOGY OF SYRINGOMYELIA.

By Simon Flexner, M.D.,
PROFESSOR OF PATHOLOGICAL ANATOMY, JOHNS HOPKINS UNIVERSITY.

I.

The patient, who first came under my charge from August to November, 1890, was a man, aged fifty years, whose family and personal history was free from any record of either syphilis or tuberculosis. Six months previously he had been thrown from a horse, striking on his shoulders and neck, and to that injury he attributed his symptoms, which then consisted chiefly of pain along the spine from the dorsal region downward and burning in the legs and feet. The knee-jerks were exaggerated; he swayed when standing with the eyes closed. He grew slowly worse on mixed specific treatment; passed from my care, and I did not see him for six years. During this time he had repeated "dysenteric" attacks, and early lost power in the legs, these members having become almost entirely helpless in 1891 and, finally, completely so in 1895. By this time sensation had become lost as high as the nipple line. He had never had the excruciating pain common in spinal tumor, but there had been moderate pain along the spine and a well-marked girdle pain. The slightest irritation caused violent spasmodic contractions of the muscles of the legs, these contractions and the burning pain of which he complained being increased by the use of strychnine. When seen in December, 1896, his stomach was very unretentive, vomiting having begun some time before after indiscretion in diet.

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[1] On account of the length of the original contribution it was considered advisable to publish it in this Journal in abstract.

The paper has been published in full in the form of a monograph, which will be sent to those interested in the subject, upon request to Dr. W. H. Hudson, La Fayette, Ala.

At this time he was dyspnœic, and his breathing was entirely diaphragmatic. He was generally free from suffering, but rotation of the head caused pain in the right arm and neck. His pupils were small and reacted imperfectly. Sensation in all parts was lost below the third rib in front and the spine of the scapula behind. Above this there was some hyperæsthesia. The legs were rigid and entirely paralyzed. Muscular atrophy had not occurred except in the interossei of the hand, and there were no destructive trophic changes.

The skin reflex was present in the legs and feet; there was violent ankle clonus and some exaggeration of the knee-jerks. The cremasteric and epigastric reflexes were lost. There was neither rigidity nor deformity of the spine.

An intradural tumor was believed to be present, and this was thought to be probably intramedullary. The thought of operation was entertained, but the patient died within a few weeks and before it was possible to operate.

I was allowed to remove the spinal cord in part only, but obtained the portion reaching from the level of the fourth cervical to that of the third dorsal vertebra. The upper five centimetres of this consisted chiefly of a tumor reaching nearly throughout the whole lateral extent of the cord and ending above and below in two cone-like projections, one of these being continued downward in the form of a central stem of what appeared to be gliomatosis. This stem was surrounded by softened cord. The general form of the tumor and of the stem of gliomatosis and the cavities in the mass seen upon making a series of sections are well shown in Plate I. Microscopical examination showed that the tumor formation involved nearly the whole cord—a mere rim of nerve-fibres surrounding it, and these showed marked degeneration posteriorly and a lesser amount anteriorly. Some ganglion cells remained, chiefly in the anterior horns; most of them, however, were degenerated. The tumor consisted of a very large number of much thickened bloodvessels, many of which showed hyaline degeneration, fibres, and of cells which were round, oval, or pyriform in shape. They were somewhat irregularly arranged, but often appeared to radiate from the bloodvessels. These appearances are more fully discussed by Dr. Flexner. In many places there were blood extravasations. The stem of gliomatosis contained large numbers of the peculiar bodies, which will be more completely described by Dr. Barker. Smaller numbers of them were found in the tumor mass also, and I believe it is probable that they play a part in the formation of the cavities, owing to the degeneration which is going on in them, though some of the cavities appear to be the result of extravasations, and, perhaps, of the obliteration of many small bloodvessels.

The curious bodies mentioned often resembled ganglion cells, and are likely to be mistaken for them, and I believe this was done in the case reported by Turner and Mackintosh,[1] in which they believed that they found ganglion cells in an area similar to the central gliomatosis in my case. I believe from my study of them that some of them were degenerated bloodvessels, and others probably degenerating glia-fibres (in the sense of Weigert); but most of them appeared to be degenerated bipolar cells. I think that in their nature the bodies are entirely similar to those found by W. Rosenthal[2] in a neuro-epithelioma of the spinal cord. He believes that they are degenerated glia-fibres (in the sense of Weigert), but in a letter to me states that he believes the bodies observed by each of us are quite similar.

This case came under my care for advice as to the propriety of operation, and had the patient's general condition allowed of it I would have operated. Surgery alone offers the only hope of relief in cases of spinal tumor, and although intramedullary tumors are incurable, even by surgical methods, I believe that in case there is any doubt as to whether the tumor is within the substance of the cord the rule should be to operate, and even when the mass is certainly intramedullary I see no reason why an operation undertaken purely for the purpose of relieving pressure would not be quite as justifiable as in cases of cerebral neoplasm, and I believe the result would be relief of suffering and prolongation of life. As to the reflexes: Undoubtedly from the appearance of the tumor and of the softened cord below there was a complete transverse division of the cord, and this certainly occurred some time previous to the man's death. Until very recently it has been thought that a total transverse lesion of the cord above the lumbar enlargement always produced increase of the deep reflexes and spasticity of the legs if the lumbar enlargement was healthy. Gowers, in a recent personal communication, states that he still holds to this opinion, and believes that in those cases in which the reflexes are lost there has been enough excitation to interfere with the function of the cells in the lumbar enlargement.

On the contrary, Bastian and Hughlings-Jackson believe that the cerebellum has an enforcing influence on the reflexes, and that if all connection with the brain is cut off the reflexes are permanently and entirely abolished. There has been much discussion of the question.

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[1] Brain, 1896, Parts II. and III.

[2] Ziegler's Beiträge, 1898, Band xxxiii., Heft 1.

Gerhardt[1] has published a case which he believes destroys the view of Bastian, while Bruns[2] has offered the record of the most reliable case that showed loss of reflexes without demonstrable disease of the lumbar enlargement or adequate changes in the nerves or muscles. I believe that my case is conclusive proof that the reflexes may remain when the cord is completely severed, if the lumbar enlargement is healthy, for in this case there was slow progress without sufficient irritation or circulatory disturbance to cause lumbar changes.

In a case to be published in the future I have observed very extensive destruction of the cerebellum by a cyst, and in this case the reflexes returned soon after evacuation of the cyst and before the patient showed any indication of resumption of the cerebellar functions. I believe, therefore, that we may conclude: That the cord may be intact and degeneration in the lumbar enlargement, nerves, and muscles absent, and yet the reflexes may be lost; that the cerebellum in the human subject may be largely destroyed and wholly inactive functionally, and yet the reflexes may persist; that the spinal cord may be entirely severed in the upper dorsal region, and spasticity of the limbs and preservation of the reflexes may still be noted; that the rigidity of the paralyzed limbs is not due to the "unrestrained" (Bastian) or "unantagonized" (Hughlings-Jackson) influence of the cerebellum passing downward to the spinal cord; that the spinal cord is the centre of the deep reflexes, and also has within itself the power of producing spasticity.

It would seem that shock from injury and severe disease may destroy for all time the power which produces the reflexes, and that the loss of the deep reflexes is produced by further causes than the total division of the cord, the cutting off of the normal influence of the cerebellum or cerebrum, or a combination of these.

II.

About the slit-like cavity in the centre of the stem of gliomatosis there is a hard tissue, which is darker in color than that in the main portion of the tumor, and with moderate magnification it becomes evident that the deep color is due to the presence of particles, which, in unstained preparations, look yellow, while the background appears paler. A few of these particles are seen in many portions of the tumor, but by far the greater number are arranged about the cavity in the stem of gliomatosis. Certain of them are undoubtedly blood-vessels, but there is no question that many are not, for they are more refractive and much more irregular in shape, commonly showing a long body, very thin at one end and thicker at the other. They are usually of the shape of a pear or a screw. With a magnification of 500 diameters the tissue about the cavity is seen to be composed of cells and fibres embedded in a granular mass, resulting from precipitation of an albuminous fluid, the chief constituents of the tissue being spindle-shaped fibres, of varying length and breadth, with eccentric nuclei, the fibres being really the protoplasm of much elongated bipolar cells. There are great numbers of granules of very minute size up to 40 μ, which represent cross-sections of fibres of different thicknesses, which are much twisted and curved; the main portion of the mass is then a dense felt-work of cells and their prolongations. It is possible that some fibres are not processes of bipolar cells, but are glia-fibres (in Weigert's sense).

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[1] Deutsch. Zeitsch. f. Nervenheilkunde, 1894, Band vi., pp. 126–136.

[2] Archiv f. Physiatrie, vol. xxv. pp. 1 to 72.

The particles previously mentioned are found within the bodies of the cells, and consist of collections of waxy-looking material, apparently the result of degeneration of the protoplasm. Sometimes they are arranged in rows, as if they were the result of transformation of longitudinal fibres in the protoplasm. They are variable in shape and size, the large particles being more refractive and yellower than the smaller, and the latter seem to be an earlier stage of the degeneration. Sometimes they seem to occupy the whole of the cell.

Water has no effect upon them. They resist the action of cold nitric acid for a long time. They are more resistant to caustic potash than all the other elements of the tumor, but finally dissolve—much sooner than myelin, and, unlike myelin, they lose their lustre when acted upon by KOH. Lugol's solution stains them reddish-brown, a subsequent addition of 25 per cent. sulphuric acid causing little change. With the Weigert-Pal staining method (Plate III., Fig. 4) they appear black, the various arrangements which they may assume being seen in the figures. The illustrations also show the pale, refractive protoplasm of the cells and the very light areas that sometimes surround the particles. This degeneration is seen chiefly in cells about the cavity in the stem of gliomatosis, but also elsewhere in the tumor, and even on the white and gray matter of the cord outside of the tumor. There is no doubt that the fibres are portions of the protoplasm of bipolar cells, and in some areas the individual cells may be made out. Counter-staining by van Gieson's method after using the Weigert-Pal method leaves some of the masses stained with acid fuchsin, especially those toward the periphery of the cells. The particles hold acid fuchsin much longer than the rest of the tissue when differentiated with picric acid after using Altmann's aniline fuchsin. The same is true of van Gieson's stain used alone. If the differentiation in this method is pushed they become bright yellow. Iron-hæmatoxylin stains them slate-gray or blackish-gray.

Rosenthal has described a degeneration which, in general appearance and in staining reactions, closely resembles this; but there is the fundamental difference that he could trace no connection with the cells, while in Dr. Hudson's case the relation is clear. In some portions the glia-fibres show the degeneration, however, and the method of preservation precluded the use of Weigert's glia stain; and I believe that the two processes are identical. For simplicity in describing the condition I would suggest the term "Degeneratio micans," or, if preferred, "Rosenthal's degeneration," since he first described the specific staining reactions.

III.

The description of the tumor which I will give is intended to supplement that presented by Dr. Hudson. It will refer to (*a*) the cells composing it chiefly; (*b*) to the bloodvessels; (*c*) to the relation between the cells and vessels, and (*d*) to the cavities. The cells are not regularly arranged, but exist in masses, the smaller collections being about the bloodvessels. The cells are oval or nearly round; sometimes irregular or pyriform, and present one or more processes. They are separated by an intercellular substance consisting of delicate fibrils, the amount of the intercellular substance varying in different parts. The cells have an interesting relation to the bloodvessels. In one variety of appearance the vessels are enclosed by fibrils; in another by cells, though even in the latter a narrow line of fibrils exists between the cells and the vessel. When the cells are removed somewhat from the vessels the latter are surrounded by a radial arrangement of fibrils, which meet just at the vessel wall. These are undoubtedly continuous with the cells.

The bloodvessels are excessively numerous, and show much thickened, hyaline walls, and there is probably some calcareous infiltration; a peculiar feature is the persistence of the vasa vasorum even after entire occlusion of the lumen. The cavities are both pre-formed and softened. The pre-formed cavities are enclosed by a layer of fibres like that around the central canal of the cord, and upon this layer is a membrane lined with high epithelium. There have been hemorrhages into these cavities, and there is granular material at the edges which looks like degenerated neuroglia.

As to the softened cavities, none of the larger spaces can be said positively to be of this nature. There are, however, areas of disintegration which begin in the fibres, and about some vessels that appear to be veins there are collections of a granular, coagulated material.

There is no doubt that the pathological new formation is a tumor, and upon microscopical examination it becomes evident that it is a glioma.

The peculiar rosette-like arrangement of the cells about the bloodvessels has not been described previously in syringomyelia, but it has been seen in gliomata elsewhere, and I have recorded[1] an instance of grouping of the cells in such a form, though not necessarily about the bloodvessels. I have in the same paper described the production of glia-cells from ependyma-cells, and the cells composing this tumor are strikingly similar to embryonic ependymal cells, and are, I believe, of ependymal origin. Those lining the cavities are adult ependymal cells, and bear the same relation to the other cells of the tumor as do the cells lining the central canal of the cord to the neuroglia cells outside. The tumor is, therefore, what I have described as "ependymal-celled glioma."

Concerning the production of the cavities in syringomyelia, the most acceptable views are those of Hoffmann[2] and Schlesinger.[3] Both believe that there is in this condition a persistence of nests of embryonal tissue behind the central canal, perhaps in the line of closure. Hoffmann considers of equal etiological importance the existence of multiple spinal canals and the occurrence in the posterior commissure of large cells, the equivalents of ependyma-cells and their subsequent activity. Schlesinger agrees in the main, and adds that disease of vessels is equal in importance to the central gliosis. He insists that high central canal epithelium is frequently found as a lining to the cavities, and states that he considers hydromyelia and syringomyelia two forms of the same anatomical state. Saxer also attributes an important rôle to the central-canal epithelium in the production of pathological glia, though he does not think it is the essential source of the new tissue.

Schlesinger believes, however, that cavity formation may occur without primary increase in neuroglia. Müller and Meder[4] have reported a case, the increase of neuroglia in which they believed was secondary, and Weigert,[5] after citing cases, expresses his belief that the primary gliosis does not exist, and that the neuroglia may be even increased. He states that there is no proof that true gliosis softens, and there are many cases of extensive gliosis, as in multiple sclerosis, in which softening does not occur. Saxer[6] believes that softening in its various stages has been observed, and that many cases of syringomyelia have been encountered in which there was a primary increase in glia.

In this case beginning and advanced softening was observed in the pathological glia, and the extent and character of the new growth proves that it is of primary origin.

The question as to whether the new tissue in this case is to be considered a tumor must be answered affirmatively. It is an independent

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[1] Journal of Nervous and Mental Diseases, May, 1898.

[2] Deutsch. Zeitsch. f. Neurvenheilkunde, 1893, vol. iii.

[3] Die Syringomyelie. Vienna, 1895.

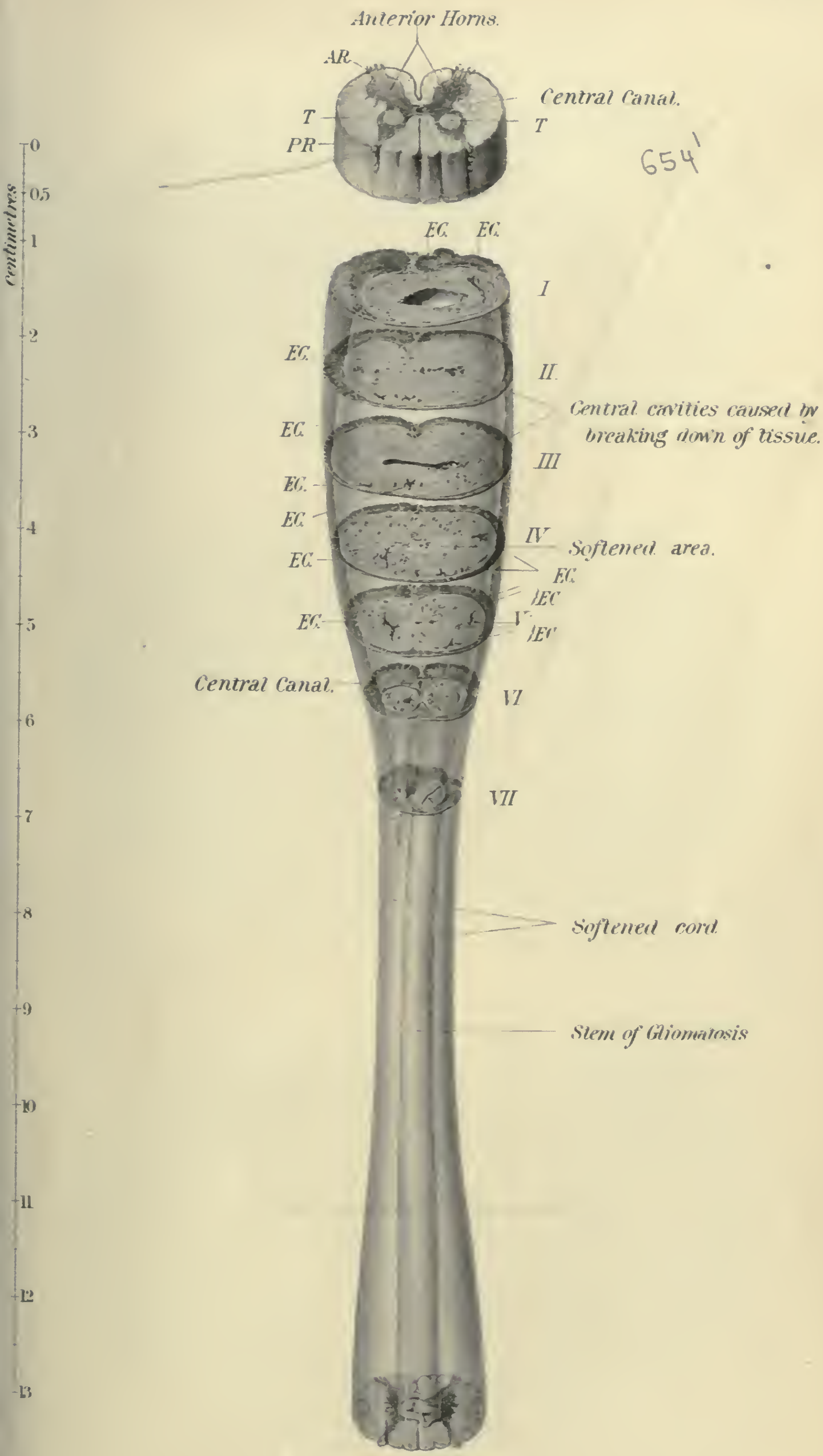
[4] Zeitsch. f. klin. med., Band xxviii.

[5] Beiträge z. Kenntniss d. Neuorolen menschlichen Neuroglia, 1895.

[6] Zeigler's Beiträge, Band xx.

PLATE I.

654'



Max Brödel, del.

Heliotype Co. Boston.

PLATE II.

654²

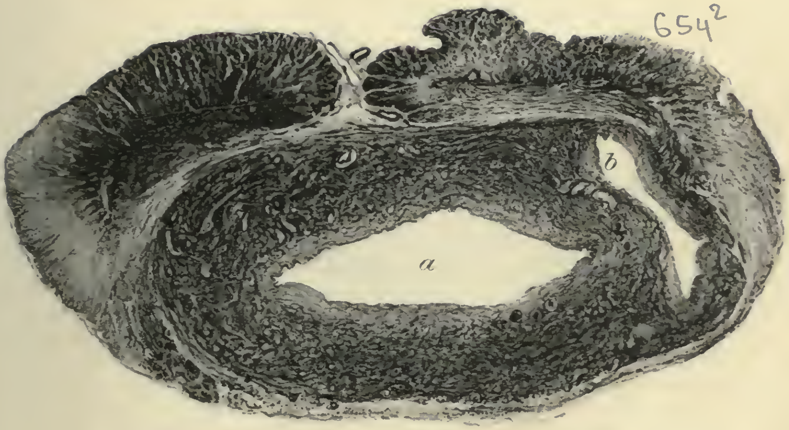


Fig. 1.

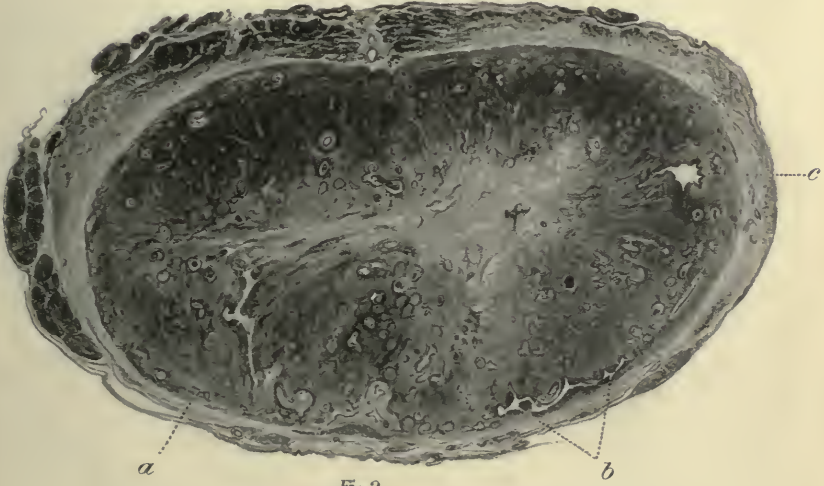


Fig. 2.

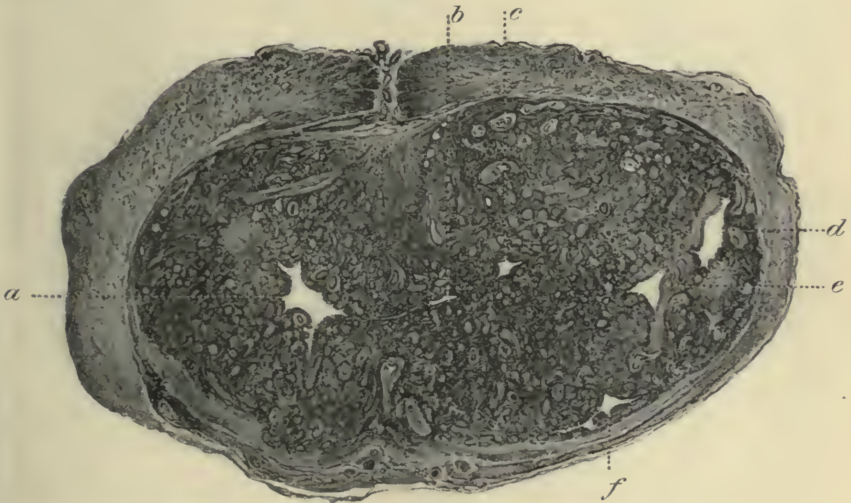


Fig. 3.

Max Brödel, del.

Heliotype Co. Boston.

PLATE III.

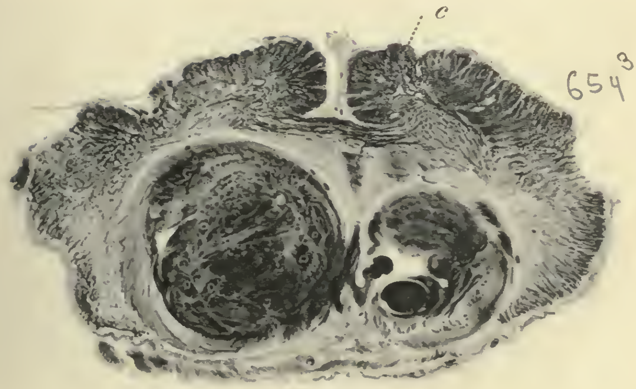


Fig. 1.

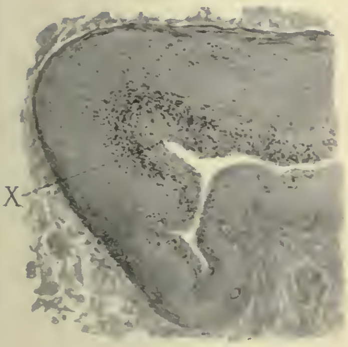


Fig. 2. 1 x 10

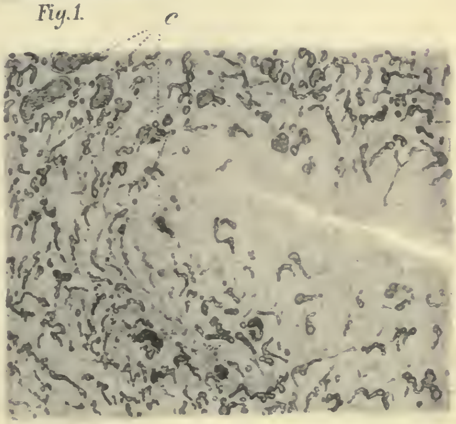


Fig. 3. 1 x 62

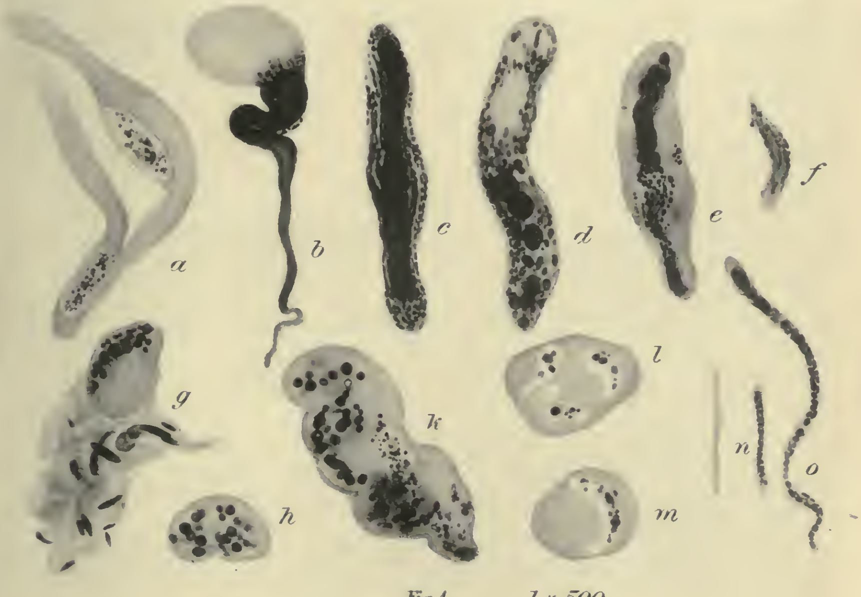


Fig. 4. 1 x 500

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Heliotype Co. Boston.

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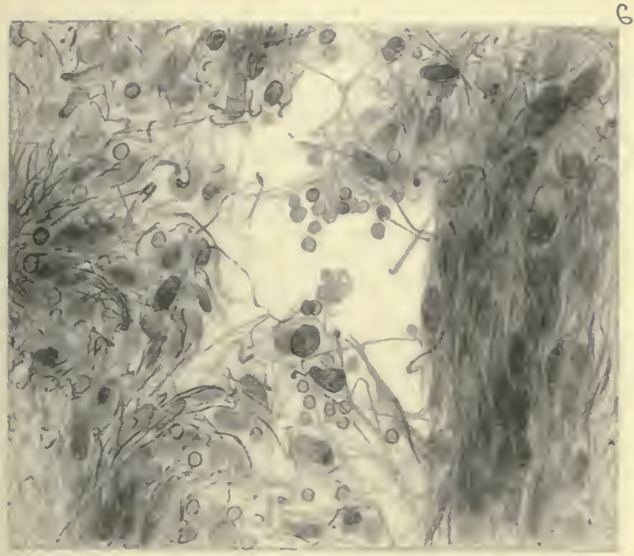

Fig. 1. 1 x 500

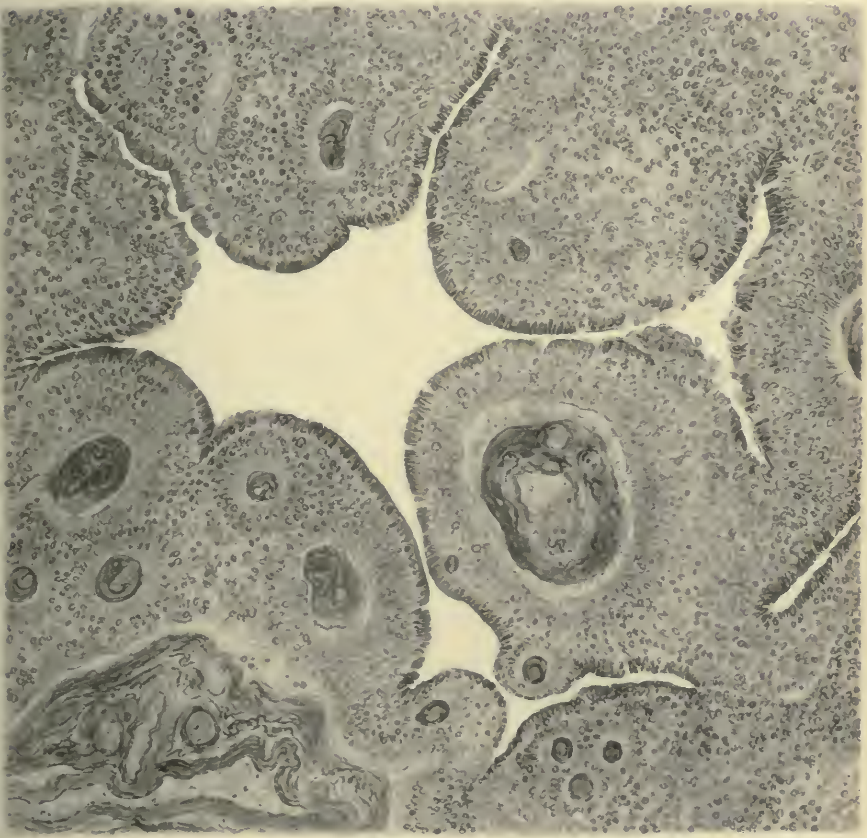

Fig. 2. 1 x 100

del, del.

Heliotype Co, Boston.

formation, and does not appear as the result of the action of any known irritant, it is circumscribed, and the cells composing it are embryonic.

DESCRIPTION OF PLATES.

PLATE I.

The drawing shows the position within the spinal cord of the new growth of glia and its extent; it also indicates the levels of the several sections and their chief characteristics. The letters E.C. indicate the epithelial cavities. T. is the tumor.

PLATE II.

FIG. 1 corresponds to Plate I., Section 1. Central growth of glia developed within the gray matter of the cord, chiefly within the posterior horns, which are entirely destroyed. Anterior horns partially preserved. *a* and *b*. Epithelial lined cavities. Weigert, Pal, and van Gieson's method. Magnified 6 times.

FIG. 2 corresponds to Plate I., Section 4. The new growth is somewhat more extensive, and, while occupying the entire posterior segment of the cord, it also encroaches upon the anterior white matter. The central zone shows rarefaction. *a b c*. Epithelial lined cavities. Magnified 6 times.

FIG. 3 corresponds with Plate I., Section 5. Except for the large number of epithelial-lined cavities, *a b c d e f*, it is similar to Fig. 2. Magnified 6 times.

PLATE III.

FIG. 1 corresponds with Plate I., Section 6. Two foci (stems) of tumor developed centrally in the cord, but posterior to the anterior commissure. The position of the central canal is indicated by *c*. In the larger focus an epithelial-lined cavity, in the smaller, a degenerative one, are shown. Magnified 6 times.

PLATE IV.

FIG. 1. Portion of Section 4, magnified 500 times. This drawing is from a softened area into which hemorrhage has taken place. It shows fragments of fibres, naked nuclei, and free red blood-corpuscles. There are independent cells and fibres, probably due to a degenerative process. Stained after Van Gieson's method.

FIG. 2. Portion of Plate I., Section 3, magnified 100 times. Projecting folds, resembling Grecian columns, covered with cylindrical epithelium, are shown. The folds are composed of rosettes of polyform cells, the similarity to ependyma cells being evident. Bloodvessels with much thickened walls and others with normal walls are present. The rosettes are developed about small bloodvessels. Stained in hæmatoxylin and eosin.

ADDITIONAL FIGURES.

Plate III., Fig. 2. Section through half of stem of new growth, showing part of cavity and distribution of the larger masses of glistening degeneration (Degeneratio micans). Müller's fluid, hardening, celloidin section unstained, mounted in salty glycerin, magnification of 10 diameters. The branch of the cavity marked *x* corresponds to the portion seen under higher power in Fig. 3.

Plate III., Fig. 3. Higher magnification of a part of the same preparation represented in Fig. 2.

c. Bloodvessels. The masses of the glistening substance assume various forms. A large number of pale swollen fibrils containing none of the refractive substance are indicated. Near the central cavity the coagulated albumin is seen. Magnification of 62 diameters (Zeiss, Compens. Oc. 4, Apochr. Obj. 16 mm.).

Plate III., Fig. 4. Series of drawings representing elements selected from a Weigert-Pal preparation of the tissues pictured in Figs. 2 and 3; magnification of 500 diameters (Zeiss Compens. Oc. 4, Apochr. Obj. Oil imm. 2.0 mm.).

a. Parts of two swollen bipolar cells met with in one field of the microscope. These two cells do not contain the glistening substance. The nucleus is in both placed excentrically, this being obvious in the one cell seen "in profile."

b. Part of long bipolar cell in large part converted into the glistening substance, here stained black. At the thick extremity is a drop of protoplasm showing none of the Degeneratio micans.

c. Part of a swollen bipolar cell showing a black core with peripheral, nearly parallel, rows of dots and rods of the black substance.

d. Part of a bipolar cell showing rows of drops and rods, as well as several large drops of the blackened substance. A few very pale areas are visible in the protoplasm.

e. Part of bipolar cell showing central core of substance stained black, which at one end of the figure is resolved into a bundle of parallel rows of black dots and rods. There is a relatively large amount of swollen rather refractive protoplasm peripherally placed, which is free from Degeneratio micans.

f. A small bundle of interrupted black lines of the stained glistening substance embedded apparently in a common ground mass of protoplasm,

g. A complex of sections of fibres of various sizes running in different directions. Fusiform masses of the black substance distinctly visible in some of them.

h. Cross section of a rather large bipolar cell showing transverse sections of the longitudinal rows of masses of the blackened Degeneratio micans.

k. Large refractive mass containing particles of the blackened glistening substance. The protoplasm has apparently "run" into this form.

l, m. Sections of swollen bipolar cells containing sections of pale masses. Inside the latter are seen irregularly distributed droplets of the blackened glistening substance.

n. Two very fine fibres, both taken from a part in which all the elements in the tissue are swollen. One of the fibres is free from, the other contains, the substance which stains black in Weigert-Pal.

o A rather fine fibre, showing fragments of the blackened substance. The upper thickened end of the fibre is seen in cross sections and on the cut surface is seen a central core, which consists of a homogeneous fused mass of the blackened glistening substance.

A CASE OF LYMPHATIC LEUKÆMIA COMBINED WITH PULMONARY TUBERCULOSIS.

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AND

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(*Studies from the Saranac Laboratory for the Study of Tuberculosis.*)

References to the combination of leukæmia with tuberculosis are not common in the literature of either disease in a careful review that we have made of the subject. Moreover, the distinctly lymphatic variety of leukæmia alone is uncommon, as well as the slow course apparently run by this case whose history of the enlarged lymph-nodes covers nearly two years.

Volpe[30] reports two cases and reviews six from previous records. Cases are described by Quincke and Stintzing, which are mentioned by Lichtheim,[1] who also had one of the splenic-myelogenous variety, terminating with acute tuberculosis. Musser[2] and Sailer found a healed tuberculous focus in the lungs of a leukæmic individual. A case of splenic-myelogenous type by Weidner[3] may have been tuberculous also.

What the influence of each disease upon the other may have been in our case is not easily determined. The two diseases seemed to have periods of activity and quiescence, with the leukæmia most prominent at the time of death, but we cannot say what their relations were except from the history, until three months prior to death. It may, indeed, have been an instance of pseudo-leukæmia gradually transformed into leukæmia, as the cases of Martin and Mathewson[4] and those referred to by Cabot[5] may have been, though the latter regards these as rare.

The comparative frequency of so-called pseudo-leukæmia combined with tuberculosis, with the latter disease as the suggestive cause of the lymphatic hypertrophy, argues our case to have been such an instance in its beginning.[7, 12]

The history indicates that the lymphatic enlargements developed simultaneously with the tuberculosis, while section of numerous lymph-nodes failed to indicate the slightest old or recent tuberculosis in them. However that may have been, the first blood examination was unfortunately not made until two months before death, when the enormous number of small lymphocytes established the leukæmic nature of the lymphatic hyperplasia, and the great excess (98 to 99 per cent.) of small lymphocytes at once placed it in the class of lymphatic leukæmias.

Which disease was primary? This is also difficult to decide from the history, since the symptoms of both seemed to develop immediately after an acute tonsillitis in March, 1895. There certainly is greater probability that the tuberculosis existed prior to that time. Unfortunately no microscopical examination was made of the tonsils after their removal in 1895, and one can only speculate as to their being tuberculous.

Negative results were obtained from cultures from the blood during life, and from the spleen, lymph-nodes, liver, and blood-clots in the heart after death.[13, 21, 30] Consequently nothing was learned in this manner pointing to an infectious origin of the leukæmia.

Attention may be called to the diminution in size of the superficial lymph-nodes, and probably the deeper ones and spleen during the last months of life, and also the enormous number of leucocytes during the final illness. The former change is mentioned as occurring in several instances referred to by Cabot[5] and Kovacs[22] in leukæmias complicated by acute diseases, also those of Nash[24] and Fränkel.[27] The white cells also diminished in these cases, except in one complicated by grippe pneumonia (Müller[23]). There was apparently no qualitative change in the leucocytes during the last days in our case.

The uric acid in three determinations in our case was markedly increased, but no attempt was made to note the relationship existing between the leucocyte-count and the excretion of uric acid.[25, 29]

With the Ehrlich-Biondi differential staining it was found that very few myelocytes were present, indicating that the marrow was little involved in the morbid process. No nucleated red cells nor "mast-cells" were recognized at any time.

History. A. C. A., aged forty-seven years, American, born in Binghamton, N. Y.; married; machinist; admitted to the Adirondack Cottage Sanitarium on June 8, 1895.

Family History. His father died of chronic tuberculosis ten years ago, at the age of seventy-three years. His mother died forty-two years ago, of the same disease, at the age of thirty-four years. Five maternal aunts and uncles died of tuberculosis. Five brothers and sisters are living and healthy (one half-brother and one half-sister).

Personal History. He had scarlatina, measles, and whooping-cough in childhood; nasal catarrh many years; gonorrhœa at eighteen; he denies syphilis and malaria. He married in 1886; his wife is healthy; there have been three children, of whom one died of pneumonia, aged ten months, and the others are healthy. He has used alcohol and tobacco in moderation.

Present Illness. The patient became debilitated in the summer of 1894 by confinement in an engine-room. A companion, who expectorated on the floor, afterward died of tuberculosis. In March, 1895, he had acute tonsillitis and "grippe," which is described by the attending physician, Dr. S. A. Twinch, of Newark, N. J., who kindly writes as follows: "In March, 1895, I was called to see A. C. A., I found him with what I took to be tonsillitis. After a few days the pain and difficulty in swallowing subsided, but some fever remained, and the swelling in the tonsils did not decrease. It was at this time that the glandular structures of the neck began to swell. I now noticed for the first time dulness on percussion at the apex of one lung, with harsh respiration and some râles. Shortly after this I took the patient to Dr. Eagleton, of this city, who removed either one or both tonsils. These specimens were not examined microscopically, but on gross examination they were very hard and dense to the touch. The swollen condition of the glandular structures of the neck remained throughout the time I had the patient under my care. In looking back upon the case I regard it as tubercular from the first. I do not think he had an attack of grippe."

In the following May the patient had a slight hæmoptysis, four weeks before admission to the sanitarium.

Status Præsens (June 11, 1895). There is the appearance of moderate anæmia; he has a blonde complexion; his weight is 122¾ pounds, eighteen pounds below the normal; his height 5 feet 3 inches. There is slight debility; the temperature is normal; the pulse 88; there is slight cough and expectoration; no tubercle bacilli were found in three slides; no chills nor sweats; appetite and digestion good.

Physical Examination. Cervical lymph-nodes enlarged; heart-sounds normal.

Lungs. There are bronchial voice and breathing and coarse râles at the right and left apex front and back, and a friction-rub in right infra-axillary space.

The larynx is normal.

August 25, 1895. Weight 131¾ pounds. Cough and expectoration slight. Temperature normal; fewer râles in chest.

February 26, 1896. Weight 134¾ pounds. Pulse 80; temperature normal. Respiratory sounds nearly dry except at the right apex.

During the past year the lymph-nodes in the right axilla have become enlarged to the size of marbles; then the left axillary and the right and left inguinal. None at present enlarged except the cervical.

Treatment. Arsenic and cod-liver oil.

Discharged May 9, 1896. Tuberculosis arrested.

September 24, 1897. Patient has lived in town since his discharge from the sanitarium, and continued in a fair degree of health until the past spring. Since July he has had diarrhœa, two stools daily; also sweats, and a temperature of from 99° to 99.5° F. and occasionally higher. His cough and expectoration have increased. He complains of weakness of vision in the right eye and of deafness. There has been no epistaxis and no priapism.

Status Præsens. Conjunctivæ quite pale; prominent temporal arteries; arcus senilis marked; general condition weak; gastric digestion fair; expectoration moderate and of muco-purulent character; bacilli found in small numbers; voice husky. There is a fulness in the neck, axillæ, abdomen, and groins. The thorax is broadened at its base. The urine contains no albumin, casts, or sugar. Ophthalmoscopic examination reveals numerous dark spots, resembling pigment, on the right retina. Impacted cerumen is found in the right ear, but both drums are normal. Tonsils, faucial pillars, and pharyngeal mucosa are much hypertrophied, and posterior nares obstructed by adenoids. There is no ulceration; the lingual tonsils are enormously enlarged, and there is much hyperplasia of all the laryngeal mucosa, with possibly ulceration in interarytenoid space.

Lungs. Dulness at both apices. Right apex: broncho-cavernous breathing; few râles. Left apex: dry, broncho-cavernous breathing in the suprascapular space behind. The heart-sounds are normal; the apex beat is at the nipple, being evidently pushed up by enlarged spleen and liver.

Spleen. The line of dulness extends 9 c.cm. from the edge of the ribs toward the umbilicus,and from the sixth rib downward to the left iliac fossa.

The lower part of abdomen is dull, possibly some ascites.

Liver. The edge is felt, being continuous with splenic dulness and extending across the abdomen 9 c.cm. from edge of ribs on the right toward the umbilicus.

The blood examination reveals leucocytes in enormous number, consisting principally of small lymphocytes. (See tables for relative numbers and differential counts.)

After September the patient continued in poor condition, and was very weak, until, on November 28th, he took a severe cold, which resulted in a bad bronchitis with profuse expectoration. His temperature varied from 100° to 103° F., while during October it had rarely reached 99.5° F. The sputum examinations several times revealed no tubercle bacilli. The excessive cough and cardiac weakness finally induced œdema, and exhaustion caused death on December 10, 1897. For some weeks preceding death the lymph-nodes, in all palpable situations, appreciably diminished in size, and the line of dulness made out in the abdomen on September 24th was decidedly changed on the left side at the time of death, owing apparently to the shrinkage of the spleen.

Date.	Leucocytes.	Red corpuscles.	
October 1, 1897	695,000	3,010,000	1 to $4\frac{1}{3}$
November 20, "	710,000	3,190,000	1 " $4\frac{1}{2}$
December 1, "	1,113,000	2,924,500	1 " $2\frac{3}{5}$
" 4, "	1,104,000	2,666,000	1 " $2\frac{2}{5}$
" 6, "	943,550	2,608,950	1 " $2\frac{3}{4}$
" 9, "	959,500	2,435,500	1 " $2\frac{1}{2}$

	Oct. 1.		Nov. 20.		Dec. 1.		Dec. 4.		Dec. 6.		Dec. 9.	
	No.	P'r ct.	No.	P'r ct.	No.	P'r ct.	No.	P'r ct.	No.	P'r ct.	No.	P'r ct.
Lymphocytes,	4907	98.14	4944	98.88	4919	98.38	4941	98.82	4947	98.94	4968	99.36
Polymorphous neutrophiles	23	0.46	25	0.5	44	0.88	43	0.86	36	0.72	14	0.28
Lr'ge mononuc. & transitional	46	0.92	19	0.38	11	0.22	12	0.24	11	0.22	15	0.3
Eosinophiles	0	0	0	0	1	0.02	0	0	0	0	0	0
Myelocytes	24	0.48	12	0.24	25	0.5	4	0.08	6	0.12	3	0.06
Total	5000	100.00	5000	100.00	5000	100.00	5000	100.00	5000	100.00	5000	100.00

Urinalysis. Albumin and sugar absent. No casts after centrifugation. Calcium oxalate in abundance; amorphous urates; leucocytes. Sediment stained for tubercle bacilli, with negative result.

Date.	Quant. 24 hrs.	Urea.	Uric acid.
September 24, 1897	780 c.c.	23.4 gms.	1.964 gms.
October 22, "	1300 "	23.4 "	2.075 "
December 9, "	1170 "	36.27 "	2.772 "

The feces were examined for tubercle bacilli, with negative result.

Autopsy (fourteen hours after death). Rigor mortis fully developed; œdema of lower extremities; superficial lymph-nodes not so prominent as during life, but on palpation all found markedly enlarged and of firm consistence; no fluctuation can be detected, and they are all movable.

Abdomen. Upon incision no fluid is found in the cavity; no tubercles on peritoneal surfaces; enlarged liver presents, occupying a large part of the abdomen. The omentum is studded with enlarged lymph-nodes, and is adherent to the abdominal wall in several places. The inguinal chains of lymph-nodes are seen much enlarged on both sides. There is no caseation on section.

The left kidney is lobulated and enlarged; weight, 270 grammes. Metastatic lymph-node is seen in its cortex the size of a pea. Capsule not adherent; cortex thickened and rather pale; it contains several small cysts and caseous spots. The lymph-nodes near the pelvis are enlarged. The right kidney is about the usual size, and appears normal in other respects. Both suprarenal capsules are soft, not enlarged, and appear normal.

Mesenteric and retroperitoneal lymph-nodes enormously hypertrophied, varying in size from that of a chestnut to that of a hen's egg, in places so bound together as to form large, irregular masses. Numerous sections reveal only soft, hyperæmic lymphoid tissue, without suggestion of caseation or fibrous cicatrices due to tuberculosis.

The urinary bladder contains about 120 c.c. (℥iv) of pale urine; the mucous membrane is normal. Prostate normal. Common iliac arteries have calcareous patches. The stomach is normal; it contains no food. The duodenum is apparently normal, though there is some redness of the mucosa, probably from passive congestion; no ulceration; the common bile-duct is patent. The ileum has a congested mucosa. Peyer's patches rather prominent; vermiform appendix normal; contains small amount of feces. The colon has a congested mucosa, and is covered with mucus, suggesting a mild colitis. There is no ulceration.

Liver. The right lobe fills a large part of the right hypochondrium and lumbar region, while the left is enlarged in the same proportion, extending well into the left hypochondrium. The edge of the organ is 9 c.cm. from the margin of the ribs on the right toward the umbilicus, and 10 c.cm. downward in the median line from the ensiform cartilage. The external surface is rather pale and glistening; no adhesions, Weight, 2720 grammes; greatest width, 28 c.cm.; greatest length, 22.5 c.cm.; greatest thickness, 11 c.cm. The cut surface is pale, with lobules distinct.

The gall-bladder is normal.

The spleen is considerably enlarged and firmly adherent to the diaphragm and abdominal wall. It extends 1 c.cm. below the free margin of the ribs. Its capsule is much thickened, giving the impression of a long-standing perisplenitis. Weight, 900 grammes; greatest length, 21 c.cm.; greatest breadth, 16 c.cm.; greatest thickness, 8 c.cm. The external surface is mottled, dark-red, and in places white from the thickened capsule. The cut surface reveals hypertrophied trabeculæ; firm consistence; hyperæmia and a few small infarctions.

The pancreas is apparently normal.

The diaphragm reaches to the third intercostal space on both sides.

Thorax. The cartilages are ossified, but the ribs are rather soft and cut easily; their marrow seems to be slightly more fluid than usual.

Heart. The normal amount of pericardial fluid is present; the position of the heart is considerably higher in the thorax than normal, due to enlargement of the liver and spleen. Both auricles and ventricles are distended by light-colored clots; there is moderate dilatation of the right auricle. Wall of the left ventricle is 1.5 c.cm. thick; wall of the right ventricle 0.04 mm. thick. The heart valves are normal. Weight of heart, 270 grammes.

Right Lung. There are general adhesions of the anterior surface and apex; base free; the parietal pleura is much thickened; 250 c.cm. of light-colored fluid in the pleural cavity; several small cavities, averaging 1 c.cm. in diameter, with caseous walls in the upper lobe; caseous spots disseminated throughout lung; œdema and hypostatic congestion of lower lobes.

Left Lung. Adhesions at apex; cavity about 2 c.cm. in diameter, containing some caseous material at the posterior aspect of the apex. Tubercles disseminated throughout the upper lobe; lower lobe œdematous, but free from tubercles and adhesions. No recent miliary-like tubercles seen in either lung; moderate pigmentation of both lungs. Bronchi not dilated; mucosa hyperæmic and covered with abundant muco-pus. Bronchial and mediastinal nodes very large, varying in size from a chestnut to a hen's egg; soft and elastic to the touch, and on numerous sections revealing hyperæmia, but no fibrous changes or caseation.

Thymus gland not found. Cervical and supraclavicular nodes, brain and spinal cord not examined, as permission was not obtained.

Microscopical Examination. Tissues hardened in 4 per cent. formalin; some in alcohol.

Liver. Capsules slightly thickened with layers of lymphoid cells directly beneath and extending downward between the lobules to a considerable distance. Large collections of these cells are to be seen in the interlobular spaces, while the capillaries and lymph-spaces are everywhere distended with lymphocytes. The cells of the parenchyma are much atrophied by pressure, and many contain particles of pigment. Branches of the hepatic, and particularly those of the portal vein, are filled and surrounded by lymphocytes in the perivascular spaces. Nothing suggesting tuberculous infiltration to be seen. The bile-ducts are empty and the epithelium is normal.

Spleen. Capsule very much thickened. Pulp consists of a dense mass of lymphoid cells. Trabeculæ in some places hypertrophied, in others they seem to have entirely disappeared. Malpighian corpuscles very few in number, and show atrophy, with fibroid changes. Pigmentation of the layer of cells just beneath the capsule.

Pancreas. Capillaries and lymph-spaces everywhere filled with lymphoid cells, as in other organs. The gland epithelium replaced in many cases by masses of lymphoid cells.

Kidneys. Capsule is apparently normal, great number of lymphocytes infiltrating all parts of the organ in the interstitial spaces. The capillaries and Malpighian tufts are distended with lymphocytes. Epithelium of the tubules somewhat swollen and granular.

Lymph-nodes consist of dense masses of lymphoid cells. The trabeculæ seem to have almost entirely disappeared. No fibrous changes or areas of necrosis can be made out.

Intestine. Sections near Peyer's patch; villi stand out prominently. The central chyle vessels and their capillaries are distended with the same round-cells seen in all other sections; lymph-follicles are quite prominent, and the collections of lymphoid cells are to be seen in the muscular layer; tubercles not recognized.

Lung. Sections through consolidated lung show old, fibrous tubercles, with intervening healthy tissue, the capillary walls standing out plainly with their contained lymphocytes.

The peribronchial spaces are much infiltrated with lymphocytes and fibrous tissue. No apparently recent tubercles are to be seen, and sections stained for tubercle bacilli did not reveal them so far as examined, which was not surprising, considering the chronic character of the tuberculosis. Specimens of bone-marrow of ribs were stained with Ehrlich-Biondi triple stain and with hæmatoxylon and eosin, and found to consist almost entirely of the small lymphoid cells, with large, round nuclei. The nuclei of many of them contained moderately coarse, deeply staining granules. Small cells with polymorphous nuclei and large cells, some with polymorphous nuclei and some with round nuclei, were present, but in relatively very small numbers.

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GASTROPTOSIS: REPORT OF A CASE IN WHICH A NEW OPERATION WAS UNDERTAKEN AND THE PATIENT GREATLY IMPROVED.

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and

Henry D. Beyea, M.D.,
of Philadelphia.

The following case is an instance of enteroptosis, or Glenard's disease, in which there was downward displacement of the stomach, intestines, and right kidney. The patient was a young, unmarried woman. There was no history of traumatism, nor of illness, nor of abdominal distention by pregnancy or fluid effusion to explain the displacement of the organs. The cause, therefore, must be considered as most probably compression of the thorax by tight clothing and relaxation of the ligaments. There was not rapid emaciation. A first operation (nephrorrhaphy) was undertaken in the hope that the gastric symptoms would subside with relief of the renal displacement. There was decided improvement, but the distinctly gastric symptoms continued, and notwithstanding prolonged rest and careful diet no relief was obtained. At this time the late Dr. William Pepper, under whose care she was, and one of the writers who had immediate charge of her case, discussed the advisability of operative interference, unaware of the fact that operative treatment had been suggested and accomplished in a few cases. In this discussion the possibility of fully restoring the stomach was carefully considered, and the only suggestion that presented itself, viz., attachment of the stomach to the anterior abdominal wall, was abandoned, because we were aware of the frequency of unpleasant symptoms in cases of adhesions of the hollow viscera of the abdomen. A second suggestion—that of gastroplication in the dependent part of the organ near the pylorus—was entertained, because we felt that the symptoms of distress, etc., might be connected with strain upon this part of the muscle of the stomach. It is not unlikely that severe strain would fall upon this part, which is the most active part (in a motor sense) in health, and in gastroptosis, the most unfavorably situated, and therefore the most prone to dilatation. If, then, an infolding of this part of the organ could be effected, and thereby the burden of the motor activity transferred to a part of the organ nearer the fundus, relief might possibly be secured for a time at least. At this point in the study of the case Dr. Beyea was called in, and suggested what appeared to us a better procedure than either of those named, and the case was submitted to him for operation. The operation will be described below. The history of the case is as follows:

Mary A., aged twenty-five years, white; no occupation; home in New Jersey; was admitted April 2, 1897.

History. Father living and enjoying good health at the age of sixty-four years. Mother died at the age of fifty-eight years. Three brothers living and well, as is also one sister. One brother died at the age of thirty-eight, of unknown cause. She believes it to have been stomach trouble.

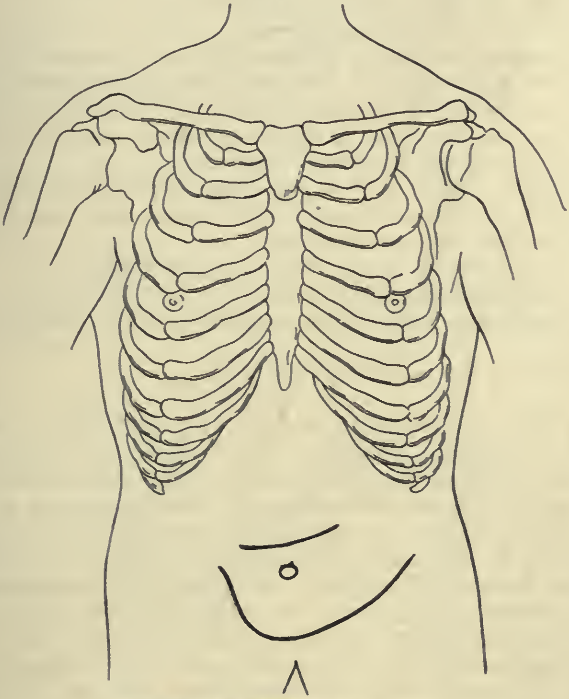
The patient had scarlet fever and whooping-cough during childhood, but since then she had enjoyed the best of health until February, 1893, which was the beginning of her present illness.

There was no history of traumatism.

In February, 1893, she noticed that immediately after eating she would have eructations of wind, lasting about two hours. The more food she ate the worse would be these eructations, and no matter what kind of food she took the eructations occurred. She occasionally had a dull pain or ache in the right flank. At present she does not complain of actual pain over the stomach, though it is at times tender on pressure. The patient has always had a good appetite. The bowels are very constipated. She has not led a sedentary life, but has always taken plenty of exercise, and she was always careful in eating, and masticated her food thoroughly.

Physical Examination. Chest ill-developed, long and narrow, especially below. The heart-sounds are normal. The lungs exhibit no abnormalities except slight "cog-wheel" breathing at the left apex. The abdomen is somewhat sunken in the epigastrium. At the umbilicus and down to two and one-half inches below it, and extending three inches to the left and one inch to the right of the middle line, is a protuberance, soft and elastic on palpation, not tender, and giving the impression of a stomach distended with gas. There is some tenderness in the epigastrium, and just under the ribs on the right side, as well as in the region of both kidneys. The right kidney is readily palpable, dislocated somewhat downward, seems a little enlarged, is very tender on deep pressure, and is quite freely movable for an inch or more. The left kidney is not palpable. The hepatic and splenic dulness are normal. On auscultatory percussion the stomach outlines reach from one-half inch above the umbilicus (the lesser curvature) to a point two-thirds the distance from the umbilicus to the pubes (the greater curvature). The right border is an inch and a half to the right of the umbilicus; the pylorus apparently at the same distance to the right and a little above the umbilical level. (Fig. 1.) The left border is on a line with the anterior axillary fold. On distending the stomach, the outlines were found to correspond with the above description. Air passes the pylorus readily. There is no palpable growth.

FIG. 1.



Position of the stomach, April, 1897.

Three and one-half hours after a breakfast (consisting, however, of bread and coffee only) the stomach contained no remnants of the meal.

One hour after an Ewald meal, 125 c.c. of contents were obtained, containing a good deal of poorly-digested bread. Free HCl was present in slight amount. The total acidity was a little low—28. No lactic acid.

The urine and the blood were found normal.

April 8th. Six and one-half hours after a test dinner, consisting of a small Hamburg steak, two slices of bread, and 200 c.c. of water, 20 c.c. of thick contents were easily removed, after which the tube became blocked with small shreds of meat. Lavage brought out several more shreds of meat and considerable fluid contents. The undiluted contents contained free HCl in quantity, and had the very high acidity of 116. There was no Uffelmann reaction for lactic acid. Much half-digested food was present.

10th. A gynecological examination made to-day by Dr. Penrose was negative. She has a very distinct jaundice to-day. Sclerotics look very yellow. Bowels costive and stools clay-colored. Otherwise she feels the same.

12th. Jaundice persists about the same in intensity, and stools are the same. Her other symptoms are not changed.

15th. Jaundice is very much less, but still is noticeable.

During this time the urine was repeatedly examined and was practically normal, though a little too concentrated.

18th. The jaundice has disappeared.

21st. Operation (by Dr. J. William White) in his clinic; nephrorrhaphy of the right kidney. The usual incision was made in the right loin, and on exposing the kidney it was found to be quite freely movable. It was then sutured in place in the usual manner and the wound closed and dressed antiseptically without drainage.

24th. Patient complains of a great deal of pain at the site of operation. A little albumin was found in the urine in two examinations after the operation, but there were no casts.

27th. Wound dressed to-day and is entirely healthy.

28th. Some slight temperature, which is due to tonsillitis.

30th. Temperature again shows a tendency to fall, and she feels very comfortable.

Soon after this the patient left the hospital.

Physical Examination on Readmission, October 9, 1897. The general appearance is distinctly improved. She looks heavier and has a better color. The examination of the chest organs shows entirely normal physical signs. The abdomen shows the same appearance as when last in the hospital. There is a prominence from an inch above the umbilicus to within an inch and a half of the pubis, which is roughly of the shape of the stomach, is tympanitic and elastic. Percussion and auscultatory percussion indicate more strongly that this is the descended stomach, of about normal size, and inflation confirms this and shows that the location and outlines of the organ are not changed since her discharge. The liver and spleen are of normal size and in normal position. The left kidney seems indistinctly palpable, but not movable. The right kidney is readily palpable, and is below its normal position by one inch or more.

12th. Lavage four and one-half hours after administration of a test dinner of Hamburg steak, a roll, and a glass of milk showed a considerable retention of fairly well-digested meat. The stomach walls are lax, and the fluid flows in readily and is returned by siphonage very slowly. A quart and a half of water is retained at a time, and the walls can be well distended with air without causing distress.

14th. She shows no change in condition or symptoms. Has a good deal of burning in lower epigastrium, usually several hours after meals. She has irregular, tender joints and complains of a " weak " and hollow feeling.

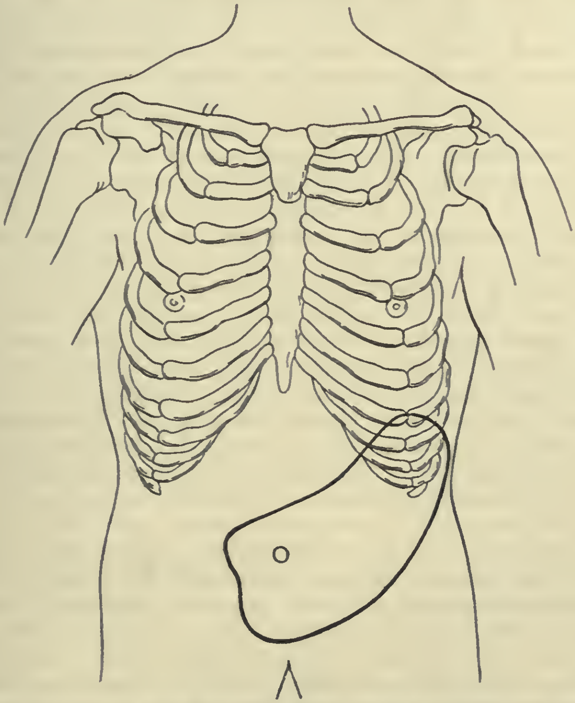
Third Admission (April 11, 1898). Her general appearance is distinctly improved. She has a better color, and has apparently gained flesh.

She complains of the same old trouble returning. Has a good deal of pain at irregular points over the abdomen, and especially some hours after meals there is a burning pain about the umbilicus, and distention with gas, and belching.

The right kidney region is often painful. The kidney may be felt somewhat below the normal position, but it is slightly if at all movable. The left kidney is not distinctly palpable.

The stomach is seen, upon simple inspection, in the same position as before. Upon percussion, however, and especially upon percussion after inflation, there seems to be some increase in the size of the organ. The pylorus is at least two and one-half inches to the right of the umbilicus, and nearly on a level with it. (Fig. 2.) The portion of the stomach lying to the right of the umbilicus is distinctly enlarged, and when distended the vertical width of the stomach extends from one and one-half inches above the umbilicus to about one and one-half inches above the pubis. The fundus reaches up to the sixth rib in the anterior axillary line or a little anterior to that line.

FIG. 2.



Position of the stomach during the third visit to the hospital (April, 1898), just before operation.

The patient was now transferred to the gynecological wards, and the operation was performed on April 19, 1898.

Operation. The patient, after having been prepared for the operation of cœliotomy and anæsthetized, was placed upon the Boldt operating-table in a position opposite to that employed for operation through the lower portion of the abdomen. The object of this position was to permit the elevation of the chest and upper portion of the abdomen, which would allow the gravitation of the intestines and stomach out of the field of operation, and give the greatest operative space, in order to gain every advantage of the Trendelenburg position. The skin of the abdominal wall was then scrubbed with green soap and water, ether and alcohol, and the field of operation surrounded by sterilized towels. An incision about four inches in length was made through the linea alba, midway between the xiphoid cartilage and the umbilicus. The tissues were separated in the usual manner and the peritoneal cavity opened, exposing a small portion of the upper curvature and cardiac end of the stomach, the gastro-hepatic omentum, the gastro-phrenic ligament, and the lower portion of the liver. The table was then elevated to the Trendelenburg position, and the stomach displaced still further downward and out of the wound by means of gauze sponges. This procedure caused the gastro-hepatic omentum and gastro-phrenic ligament to be slightly stretched and separated from the underlying structures, which permitted an accurate determination of the length of the gastro-hepatic omentum and very much facilitated operative manipulation. The gastro-phrenic ligament was seen to be well developed, and evidently formed a strong support for the cardiac end of the stomach, while the other portion of the gastro-hepatic omentum was composed of thin, delicate peritoneum, but was determined to be of sufficient textural strength to hold sutures, and also gave much support. Retractors were now introduced and the liver held aside by the fingers of an assistant. Interrupted sutures were next introduced to shorten the gastro-hepatic omentum in the following manner: The first suture caught the gastro-phrenic ligament above at a point as near as possible to the diaphragm (a distance of about two inches from the diaphragm) and below, just above the gastric vessels. After this suture had been placed the gauze sponges which displaced the stomach were removed and the suture temporarily tightened, so as to determine the height to which the stomach could be brought by this manner of suturing and the degree of support which would be furnished to the stomach. This having been determined to be satisfactory, the stomach was again displaced out of the wound and the suturing continued. The second suture was introduced through the gastro-hepatic omentum opposite, and about one-fourth of an inch from the first one, followed by a row of eight or ten others introduced in the same way, to include the left three-fourths of the gastro-hepatic omentum. In order to be sure of gaining a wide surface of adhesion, particularly in relation with the gastro-phrenic ligament, three or four more sutures were introduced, which included the peritoneum above and below those already placed. The gauze sponges were again removed, and the first and then the second row of sutures were tied, forming a tuck in the gastro-hepatic omentum and gastro-phrenic ligament. After this had been accomplished the stomach was seen to occupy what was thought to be a normal position. All gauze sponges were then removed from the abdominal cavity and the table lowered until the patient was in a horizontal position. The wound was closed by suturing the peritoneum with fine silk, the fascia with silver wire, and the skin with fine silk, with an intracutaneous stitch. The wound was dressed with two layers of sterile gauze held in position by antisepticized colloidon, covered by several more layers of sterile gauze. In order to assist in giving support to the stomach and aid in preventing traction upon the sutures during the early part of convalescence a large compress of gauze and cotton was placed over the lower two-thirds of the abdomen, and the dressings and compress held in place by a many-tailed flannel binder.

Fine silk was employed for suturing the gastro-hepatic omentum and gastro-phrenic ligament. The needles were small, curved, and round-pointed. This particular form of needle was selected to prevent tearing the tissue in the introduction of sutures. In introducing the needle care was taken to introduce the stitches evenly and accurately without causing tension. Each suture also caught the greatest possible amount of tissue practicable, in order to give the greatest strength and form a wide adhesion.

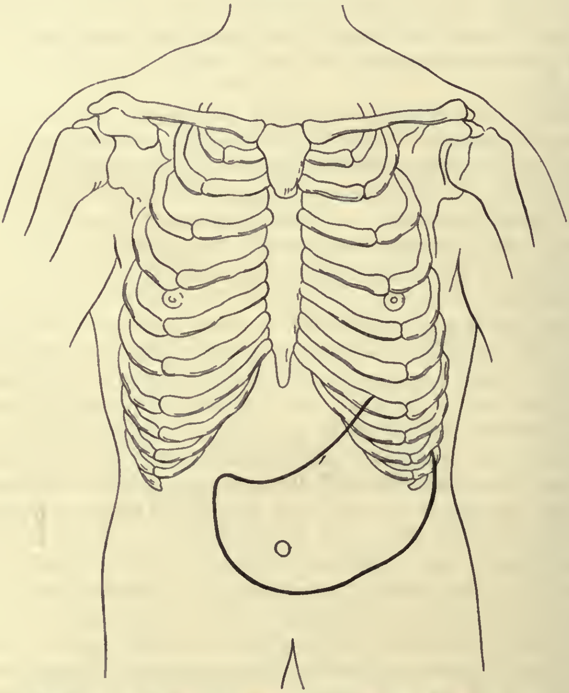
After the operation, which lasted forty minutes, the patient was returned to bed in good condition, the pulse being 98 and the temperature 97° F. She made a normal convalescence. After the first five hours the pulse was never more frequent than 78, and the temperature but once reached 100° F. She was given nothing by the mouth for forty-eight hours except small amounts of hot water, at the end of which time drachm doses of milk and lime-water began to be administered hourly. The amount of milk was gradually increased after twelve hours, until, on the fifth day after operation, she was taking five drachms of peptonized milk every hour. The bowels were opened by an enema thirty-six hours after operation. She was kept in bed and upon her back until June 28th, and left the hospital on July 1st.

After her discharge from the hospital she wrote us from time to time about her condition. After a sufficient time had elapsed we requested her to return to us for examination. The results of this examination are recorded in the next paragraph.

November 10, 1898. The patient visited the hospital to-day, reporting a gain of ten pounds in weight, and was feeling somewhat better than previous to the operation. A stomach-tube was inserted and the stomach inflated with air. This showed that the lesser curvature was still well supported, and the greater curvature did not extend more than an inch and a half below the umbilicus, taking the lowermost border of the sloping projection caused by the inflation as the situation of the greater curvature. (Fig. 3.)

March 14, 1899. The patient again returned to the hospital upon our request, and states now that she is very much better, and has gained nine pounds since her last visit. She is able to eat freely without discomfort, has a distinctly better appetite, and feels inclined to do more work about the house. The stomach was inflated with air and was found to occupy exactly the same position as that discovered at the last examination. Palpation of the kidney reveals the fact that it has been sustained in its normal position. Twenty-four ounces of water were then allowed to flow through the stomach-tube, when the patient complained that the stomach felt full. The tube was carefully removed, and the gastro-diaphane was inserted. When the light was turned on a bright spot of illumination was observed (umbilicus) and diffuse illumination of the area, which had been prominent upon inflation, and having almost the same superficial boundaries. The results of this examination were, upon the whole, unsatisfactory on account of the haziness of the outline

FIG. 3.



Position of the stomach November 10, 1898, and March 14, 1899.

of the light and the changed relations with changes in position of the patient and changes in the tube within the stomach.

We have made a careful search through medical literature to determine what operative measures have been used for the relief of this condition, and have found the cases which are abstracted below. It will be observed that in none of these was the operation exactly similar to that which we undertook, although one of the operators (Davis) describes a very similar operation for the relief of descent of the small intestine which accompanied the gastroptosis.

Treves[1] records an interesting case, as follows: The patient, a young lady, aged twenty-two years, had been ill for six years. She was highly cultivated, but had never been considered as a neurotic subject, nor did she appear so. The illness began six years before with an acute abdominal disturbance, supposed to be an ulceration of the stomach or intestine. The symptoms rather pointed to an intestinal trouble, as far as could be made out from the story of the patient. There had been a fall previous to this illness, and she never fully recovered after it. The symptoms in general were those associated with Glenard's disease. Abdominal pain was almost constant, vomiting was common, and the vomited matter was intensely acid. She was much worse when in the upright position. A right floating kidney had been discovered and had been fixed in place by a surgeon three years before, and it still remained in good position. The rest treatment was tried, but the patient grew worse under it. Finally she had found relief by wearing a belt, but the latter had to be made increasingly stronger to support the viscera. Treves operated in June, 1895. The abdomen was opened in the middle line a little below the xiphoid cartilage. The liver was found presenting at the wound, and the stomach occupied a lower level than usually, but it was impossible to drag it upward. This was found to be due to the fact that the greater omentum was rolled up into a rigid cord, which was fixed to a mass of stony hardness in the right iliac region. A second incision was made over this mass, and it was found to be a collection of old, tuberculous glands. These were at once removed. The stomach then became movable. The liver was secured in place by ligatures. These concerned the lines of the falciform ligament and the umbilical fissure, the most important stitch being passed through the liver near its edge and penetrating the round ligament. The other stitches involved the round ligament and the falciform ligament. Above, the sutures were passed through the fibrous tissue of the abdominal walls at the side of the xiphoid cartilage. The patient made an excellent recovery without complications, excepting a small stitch abscess, and the troubles depending upon the ptosis of the viscera disappeared. She was able to walk without discomfort. The gastric symptoms almost disappeared, and five months after the operation, when the patient left England, the only complaints were of weakness and of some intestinal pain which may have been due to adhesions.

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[1] British Medical Journal, January 4, 1896.

Duret[1] describes a case of gastroptosis in which he performed a novel operation, which he designates "gastropexie." The patient was a woman, aged fifty-one years, who had been in good health up to a comparatively recent period. She was married at twenty-two years of age and had two children. She had had some nervous symptoms which were attributed to cervical metritis and displacement of the uterus. Three years before she came under observation she had suffered with bad digestion, due to dietary irregularities. The symptoms of gastric disturbance coincided with the first days of her periods. The dyspeptic troubles increased, and she lost weight, the decrease amounting to seventeen and one-half kilos. No improvement followed treatment of various kinds, and she came under the author's care in a much emaciated state, though her face did not show the evidence of severe disease, the skin having a rather healthy color. The abdomen was hollow, and on palpation in the iliac fossa the cæcum could be found distended with fecal matter. In the left iliac fossa he discovered a hard mass, which could be rolled under the finger, and which was the sigmoid flexure turned upon itself, small in size, not being larger than the index-finger. The transverse colon could not be plainly palpated. The liver was moderately depressed or enlarged; it extended about the width of the finger below the ribs. The spleen was not accurately delimited. In following the procedure of Glenard he could not determine any movability of the right kidney. On percussion the epigastric region was hollow, and superficial palpation determined the aortic contractions very plainly. The stomach could not be delimited by percussion, but on examining the splashing sounds it was discovered that the greater curvature extended to a point about four fingers' breadth above the pubes. Lavage of the stomach was practised, partly as a therapeutic measure and partly for diagnostic purposes, and it was found that it was possible to introduce a quantity of water, amounting to a litre and a quarter, without producing a tendency to vomiting. It was finally concluded to undertake an operation, and the author proceeded as follows:

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[1] Revue de Chirurgie, 1896, p. 421.

After abdominal incision was made from a little below the ensiform cartilage downward 8 or 10 cm., sparing the peritoneum in the upper end of the incision, sutures were inserted through the peritoneal reflection of the stomach, at the junction of the lesser curvature and anterior wall of the stomach and through the peritoneum in the upper angle of the superficial wound, and the stomach thus fastened in place. The abdominal wound was then closed. The patient's general condition improved very much after the operation, and she was finally discharged, having begun to take ordinary food. The functions of the bowels were normal. Digestion was no longer painful. The tongue was clean, and she was able to take all sorts of food, including bread, which had been very difficult to digest before. She had gained in weight.

Byron B. Davis[1] records two cases in which operation was undertaken for the relief of gastroptosis. With regard to the diagnosis, he states that "if the lesser curvature is found half-way or more from the ensiform cartilage to the umbilicus, no doubt can exist that ptosis not only of the stomach but of the intestines is present." Some form of treatment must be devised which will support the displaced parts, and the functions of the intestines must be regulated in some way. He notes that the only surgical procedures undertaken prior to his report were gastropexy and gastrorrhaphy. Shortening the mesentery, which is the method pursued by himself, had not been attempted before, nor had shortening of the gastro-colic omentum been practised.

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[1] Western Medical Review, October 15, 1897.

Case I.—A farmer, aged sixty-three years, presented himself with a large abdominal hernia, extending from two inches above the umbilicus to the symphysis. When he stood erect the recti separated for a distance of three or four inches, and a considerable part of the abdominal contents was extruded. This hernia made its appearance six or seven years before, and was caused by a laparotomy for the relief of an omental or intestinal tumor. The patient suffered with pain in the umbilical region and great discomfort in the lower part of the abdomen when he stood erect. There was also a left inguinal hernia. An attempt to cure both herniæ was made in February, and when the patient returned in July there was no recurrence of the herniæ, but he still had great discomfort and pain in the umbilical region, and it was supposed that adhesions had re-formed. The following operation was undertaken: A median incision was made from near the ensiform cartilage to an inch below the umbilicus. The adherent omentum was detached and a part ligated and removed. Then the stomach was drawn up into its natural position, and the lesser omentum near its reflection from the stomach was fastened to the peritoneum near the ensiform with fine silk sutures. The stomach was not greatly dilated, the transverse colon was fully six inches below the greater curvature, and a tuck was taken in the gastro-colic omentum, the bloodvessels being carefully avoided by the sutures. This procedure shortened the distance between the colon and stomach to two or three inches. The small intestines were brought forward, and the mesentery was found to be so much elongated that the loops of intestine could be raised four or five inches above the abdominal wall without great tension on the mesentery. In order to shorten the latter without interfering with its blood-supply he used a long needle with No. 4 silk, inserted the needle near the apex of the mesenteric triangles representing the mesentery between neighboring arterial branches, penetrated the mesentery, and brought the needle through in the opposite direction at the centre of the base of the triangle formed by its intestinal attachment. The suture being tied, a reef was thus secured in the mesentery, shortening it from two to three inches. The circulation was not impaired in the least. Sutures were thus used the entire length of the small intestine, not in every interarterial space, but almost as close as that. Altogether ninety-two sutures were inserted between the upper jejunum and the iliocæcal valve. The patient recovered with practically no shock from the operation, and did well. The bowels moved on the third day, and on the twentieth day the patient was out of bed, and left the hospital four weeks from the day of the operation. There was apparent improvement at the time of the report, in September, 1897.

Case II.—Mrs. P., aged thirty years, the mother of two children, had suffered for two or three years with great distress after eating, and on standing she felt a downward pressure and bulging in the lower abdomen. There was obstinate constipation, great headache, and nervousness. The liver dulness was found to extend downward one and one-half inches below the ribs. The lesser curvature of the stomach was an inch above the umbilicus. The motor power of the stomach was normal and the examination of the gastric contents showed normal conditions. The patient had been operated upon previously for the repair of the cervix and a torn perineum, but was practically unimproved. On September 4, 1897, an operation was undertaken for the relief of the gastric dislocation. The stomach was found as previously outlined. The lesser omentum near its attachment to the stomach was stitched to the peritoneum on a level with the ensiform cartilage; and at the same time, as the stomach was considerably dilated, gastrorrhaphy was performed, thus serving the double purpose of reducing the size of the stomach and raising the transverse colon. The operation required one hour, and there was no shock from it. The bowels moved on the third day, and on the ninth day the dressings were changed and the sutures removed.

Ferrari,[1] in discussing gastroenterostomy in the treatment of ectasia and ptosis of the stomach, advocates gastroenterostomy under certain circumstances in the latter condition.

In the discussion Nicomi expresses opposing views, and advises only gastroplication.

Hannecart[2] describes a case of marked splanchnoptosis and relaxation of the abdominal walls upon which Depage operated with success. The operation was as follows: A transverse incision was made from the end of the eleventh rib to the opposite side at the same point. Two converging incisions were made from the ends of this obliquely downward to about the horizontal level of the umbilicus, where they were about 5 cm. distant from the middle line. From these points two arched incisions were made, which united in the neighborhood of the symphysis. After the skin of this part was separated, the linea alba, together with the edges of the rectus muscle and the peritoneum, were extirpated. The parts were brought together in a T-shape, and thus the abdominal wall was narrowed in a vertical as well as a transverse direction. The suspensory ligament of the liver was fastened in the upper angle of the wound, and thus the liver was fixed in its normal position.

Terrier and Hartmann[3] record a case, as follows: A woman, aged thirty-one years, had been ill for two years, her sickness having commenced by inability to take wine, the taking of the least quantity of this causing severe pain. She had intense constipation, some purgative being invariably necessary to secure a movement. When she came under observation she was cachectic in appearance, and on distention of the stomach this organ was found dilated and dislocated in a downward direction. The dilatation, as figured in their cuts, involved the pyloric end of the organ mainly, and was of the form alluded to in our discussion of dilatation secondary to dislocation. The operation, performed by Dr. Hartmann, was a combined gastrorrhaphy and gastropexy. A number of parallel sutures were fastened in the dilated pyloric end of the stomach, so as form a plicatio, and the whole organ was then elevated and fastened to the abdominal walls. She was carefully fed for a time after the operation, and her general condition improved greatly. Three weeks after the operation inflation of the stomach showed it to be in the normal position. From October 12th, the day previous to the operation, to January 10th she gained fourteen and one-half kilos.

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[1] Revue de Chirurgie, 1897, vol. xvii. p. 337.

[2] Journal Méd. de Bruxelles, 1898, No. 8.

[3] Chirurgie de l'Estomac. Paris, 1899.

AN OUTLINE OF SOME OF THE MEDICAL USES OF THE RÖNTGEN LIGHT.

By Francis H. Williams, M.D.,
OF BOSTON.

The subject of X-ray examinations in medical practice has developed to such an extent that it cannot be fully presented in a short paper. Two courses lie open: either to take up a single disease and discuss it in detail or to go over a number of diseases briefly. It has seemed to me that at the present time the latter would be the more acceptable course. I shall, therefore, present the results of the clinical observations made in some of the patients I have examined in order to suggest ways in which an X-ray examination may corroborate other evidence or assist us to an earlier or to a more correct diagnosis, and I will leave the fuller discussion of them for another occasion.

In a general way X-ray examinations may be said to have thus far been most used to detect foreign bodies or changes in shape and composition of bones, as in fractures, dislocations, necrosis, tuberculosis, rickets, and osteomalacia.

Gouty deposits about the joints, as shown by Dr. Arthur L. Fisk, are distinguished from rheumatoid arthritis by means of an X-ray photograph.

The stomach may be examined by giving the patient a large dose of subnitrate of bismuth (which the X-rays do not easily traverse) with food and then looking at the shadow of its contents by means of the fluoroscope. (Fig. 1.) I have also taken in this way an X-ray photograph of the stomach.

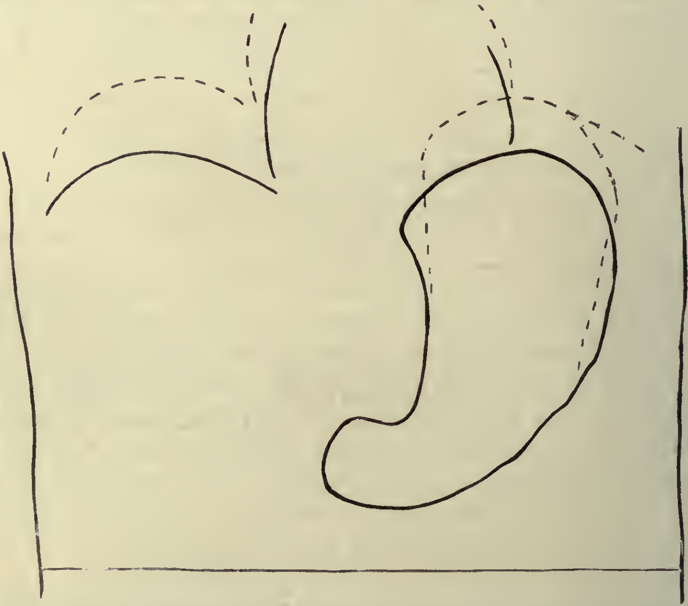
Carcinoma. In the cases of carcinoma of the stomach that I have examined with the fluoroscope if the growth could be seen it could be felt. I have taken one X-ray photograph of a carcinoma of the stomach and its thickest portions, as shown at the operation, corresponded to a dark area shown in the photograph and seen in the fluoroscope.

Ascites. The surface of the ascitic fluid may be seen in the fluoroscope if the patient is examined lying on his back, the physician looking through the body transversely.

Renal or vesical calculi containing phosphate or oxalate of calcium of fair size have been detected by an X-ray photograph.

X-ray examinations may be used in other diseases or conditions of the abdomen and pelvis, but I will not discuss them here.

FIG. 1.



Tracing from a girl seven years old (original two and a half times as large), showing the outline of the stomach one hour after a meal of bread and milk containing subnitrate of bismuth. The full horizontal line is at the level of the iliac crests; the full lines at right angles with it ar the outlines of the body; the other full lines indicate the position of the diaphragm, heart, and stomach during full inspiration; broken lines show position in expiration.

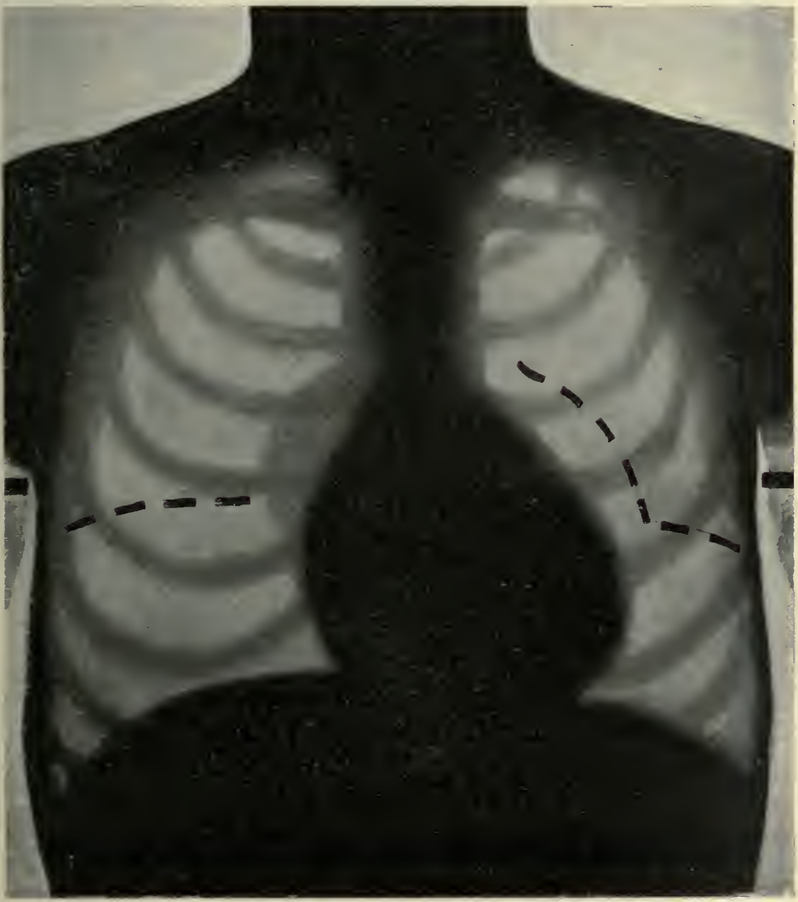
Mr. W. B. Cannon, student in the Harvard Medical School, who has published an excellent article on the movements of the stomach in the cat studied by means of the Röntgen rays, has made with me some observations on the size and shape of the stomach in human beings during digestion, which are as yet unpublished.

One of their most useful medical applications is for diseases in or contiguous to the thoracic cavity. I shall consider this subject largely from the stand-point of a practitioner whose special interest is diseases of the chest, for it was the confidence which I had in the possibilities of the fluoroscope to assist in the diagnosis of diseases of the lungs and heart that led me to begin and develop this method of examination.

I think the subject can be most clearly presented by the following cuts, Figs. 2 to 6, inclusive, and Fig. 9, which are reduced copies of diagrams made by transferring outlines that I drew on the skin of patients while looking through the fluoroscope, to a skeleton outline copied from one of Luschka's plates. The patients were examined lying down, except the one suffering from pneumo-hydrothorax.

Since it is in part the *movement* of the heart and lungs which we wish to observe, an X-ray photograph does not answer as well as the fluoroscope or fluorescent screen. Examinations with this instrument have also the advantage of being made more quickly. The photograph takes time to develop, but gives more detail in parts that are at rest.

FIG. 2.

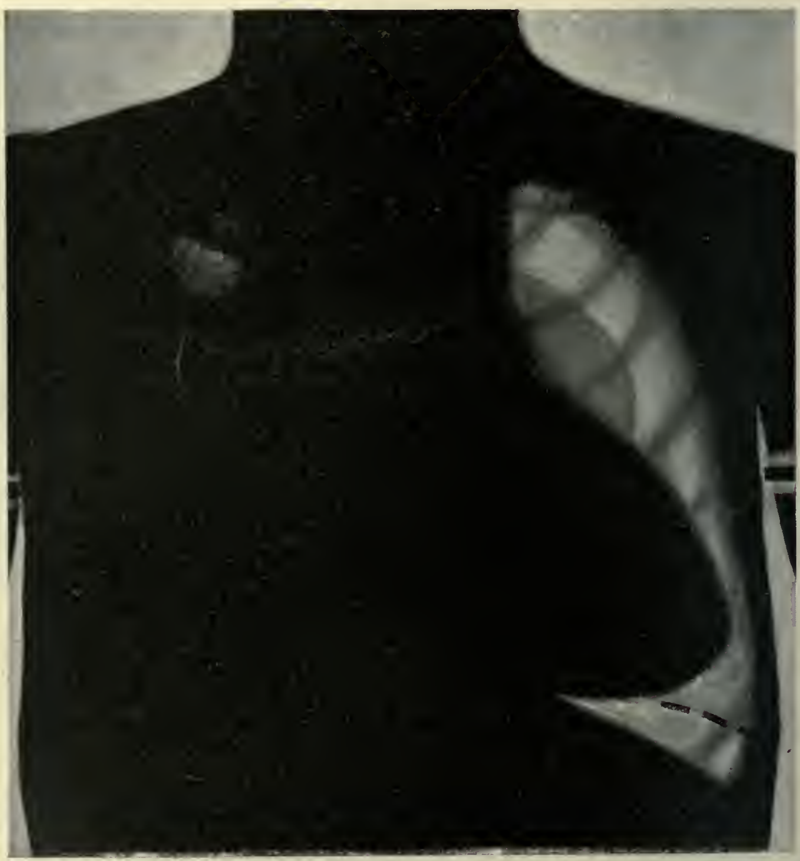


Normal thorax in full inspiration; the broken lines show position of diaphragm and heart in expiration, but the diagram does not indicate that during this time the light area is narrower.

The position of the diaphragm and heart are shown as in full inspiration in the diagrams, Figs. 2 to 6, inclusive, and Fig. 9, and the broken lines indicate the position in expiration. The dark lines at the sides represent the level of the nipples. The anode of the Crookes tube was placed under the median line where it is crossed by a line joining the nipples.

In health (Fig. 2) it will be seen that the diaphragm has a wide excursion between the extremes of respiration, and that the heart also changes its place. In order to show what nice distinctions the fluoroscope is capable of making let me state that the difference in the brightness of the lung area between expiration and full inspiration may be perceived in the fluoroscope. In health the lungs are seen to be lighter about full inspiration and darker in expiration, as they then contain

FIG. 3.

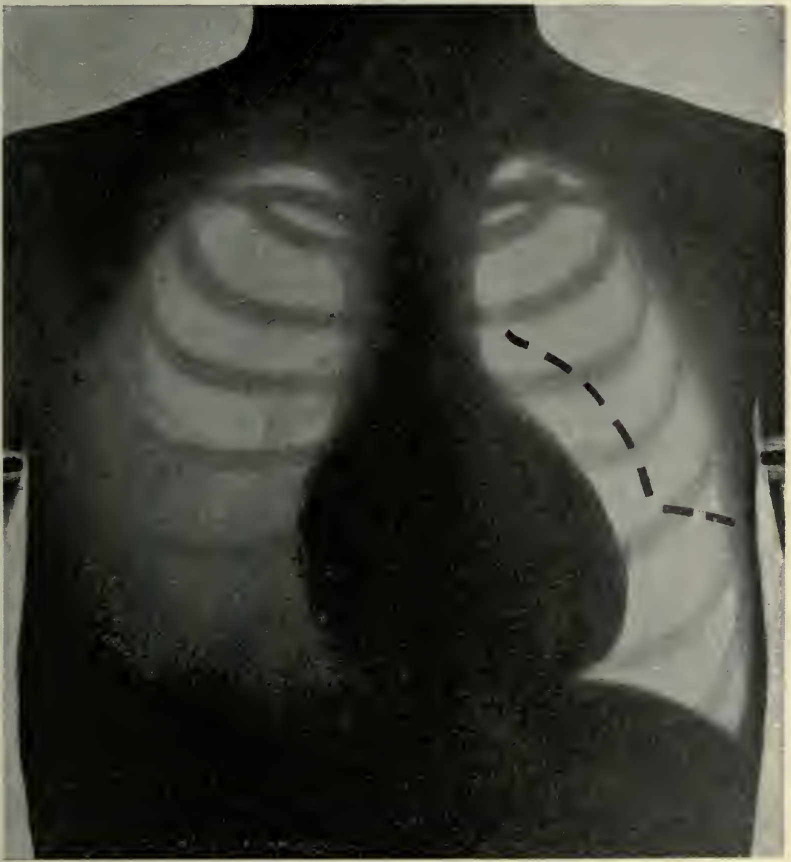


Pleurisy. With large effusion. The heart in this patient was enlarged and displaced and the movement of the diaphragm was lower down and restricted. After the tracing for this diagram was made a gallon of fluid was withdrawn from the right side, the heart was then seen to be nearer its normal position, and the excursion of the diaphragm on the left side was much greater than before, that is, nearer the normal. Broken line shows position of the diaphragm in expiration.

more blood per cubic inch. This shows how conditions involving congestion, as in early tuberculosis or in some forms of cardiac disease, may alter the appearances in the fluoroscope.

The diagram of health (Fig. 2) is the key to the others, and should be used as a starting-point in studying them further. The diagram of each of the diseases should be compared with the diagram of health, especially the amplitude of the excursion of the diaphragm and its position in the thorax in certain of them. In fifty adults I have found the average excursion to be two and a half inches on the left side and an eighth of an inch more on the right. In young adults the excursion was greater than in older individuals.

Fig. 4.

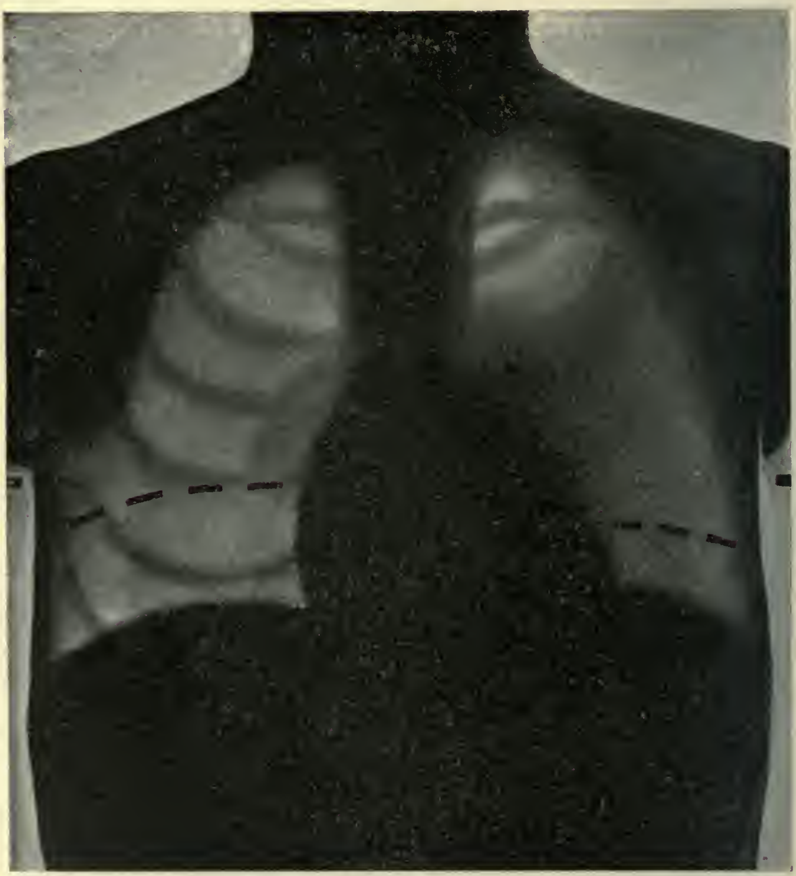


Pleurisy. With small effusion. The presence of fluid on the right side in this patient was doubtful by auscultation and percussion.

We will begin with *thoracic aneurism.*

Many thoracic aneurisms which were formerly beyond our reach for diagnosis may now be recognized with certainty, and, further, symptoms due to aneurism are sometimes ascribed to other diseases, and an X-ray examination is required to establish the diagnosis. One of my diagrams represents the condition found in a patient sent to me in consultation, who had a stricture of the œsophagus and into whose throat an œsophageal bougie had been passed every third day for months. Another patient, who had a similar aneurism, was thought to have intercostal neuralgia, and had been operated on for this previous to coming to me. In one of my own patients with cardiac disease I was

FIG. 5.



Pneumonia. Seventeenth day of disease. Dark area and restricted movement of the diaphragm on the left side; the movement is also less than in health on the right side. The dark area diminished gradually, and the excursion of the diaphragm on both sides increased from week to week.

about to give digitalis, but an X-ray examination showed the presence of a thoracic aneurism in an early stage, and I was thus spared from doing him harm. In no other way than by an X-ray examination could these aneurisms have been detected in this early stage.

In emphysema I have pointed out that the excursion of the diaphragm is less than in health and that it is lower in the chest. The heart is in a more vertical position than in health, and moves less between full inspiration and expiration. In marked cases the right side of the heart, both auricle and ventricle, is larger than normal.

In pleurisy with large effusion (Fig. 4) the heart is much displaced, as indicated by the diagram.

In pleurisy with slight effusion (Fig. 5) the appearances in another patient are shown.

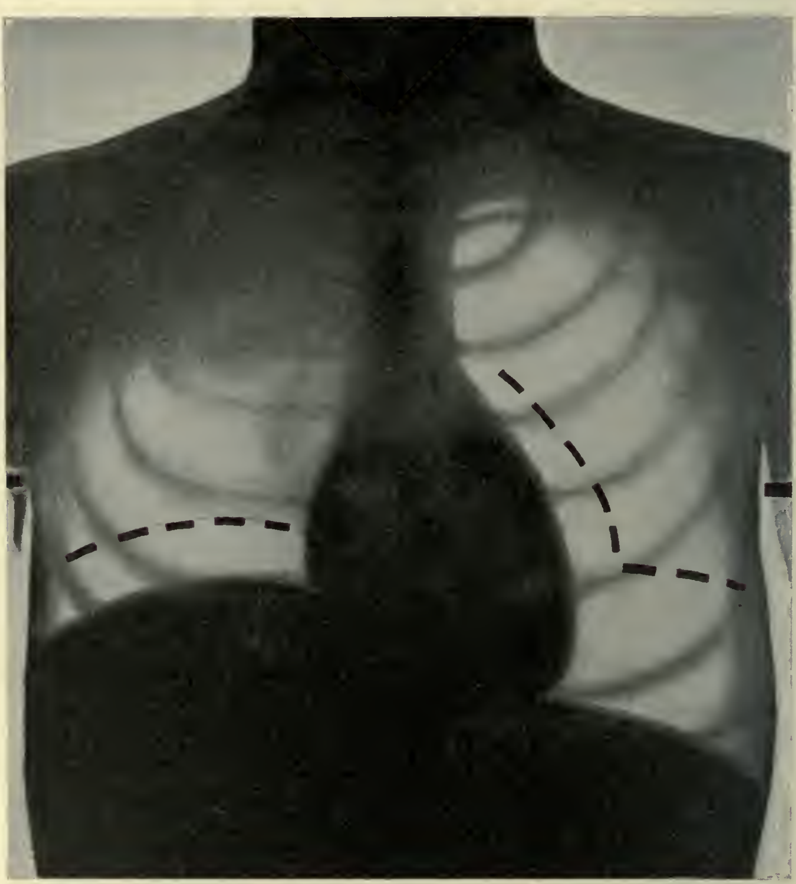
Adhesions of the pleura without thickening would not obstruct the passage of the rays, and therefore could not be seen in the fluoroscope, but might be suspected if the movements of the diaphragm were restricted.

Auscultation and percussion may leave us uncertain whether we have to deal with an adhesion with thickening or with a pleuritic effusion, but the fluoroscope can usually tell us if fluid is absent unless it is encysted. If present the diaphragm line is obliterated on the side of the effusion, especially in the outer portion, where this muscle curves down to the side of the chest, because fluid would sink and fill in their lower and outer angle unless it were encysted. The ability, then, to follow this portion of the diaphragm line proves the absence of fluid except in the particular case just mentioned. Even in such a case I have suspected the presence of fluid by means of the fluoroscope, and this suspicion was confirmed in one case by an autopsy and in another by tapping. The X-rays enable us to choose the most desirable place for inserting the needle.

Calcareous deposits in the pleura are seen as dark areas in the fluoroscope. This is also true of some calcareous deposits in the aorta or in certain portions of the heart.

In *pneumonia* (Fig. 6) the dark area of the pneumonic process is seen, and, further, the excursion of the diaphragm is less than normal. The appearances in pneumonia are very conspicuous, so much so that I have not chosen a patient in the most active stage of the disease, but rather during its subsidence. This diagram was made from the appearances on the seventeenth day of the disease. No signs were found by auscultation and percussion on this day. This shows that there may be conditions in the chest which are readily seen in the fluoroscope, but which are not patent to auscultation and percussion On the thirty-second day there were still signs of disease by the fluoroscope, but the patient was then discharged, otherwise an abnormal condition of the lungs might have been followed by means of this instrument for some time longer. In cases that I have examined after their discharge from the hospital the lungs attained their normal brightness before the excursion of the diaphragm was normal.

FIG. 6.



Pulmonary tuberculosis. Right side. The excursion of the diaphragm is restricted. and restricted in the upper part of the excursion. In emphysema it is restricted in the lower part.

Central Pneumonia. I have recognized the presence of central pneumonia with the fluoroscope before there were any signs upon auscultation and percussion.

Pulmonary Tuberculosis. It seems hardly necessary to state that the diagnosis of pulmonary tuberculosis is not made by an X-ray examination alone, but the fluoroscope may show that the lung is in an abnormal condition in two ways; the diseased portion appears darker than in health, and the excursion of the diaphragm in quiet breathing and in full inspiration is restricted, and restricted on the lower side—that is, it is higher up in the chest. These signs lead us to suspect tuberculosis. It is well to make a second examination after an interval of a few days, for both of these signs may sometimes be found temporarily in other conditions, as in anæmia and debility, and after typhoid fever. Whether they may then indicate a soil favorable to the development of tubercle bacilli I will not now discuss. Also a diminished excursion of the diaphragm may occur in emphysema; but in this case the muscle goes lower down in the thorax, not higher. I have taken every opportunity to examine patients with tuberculosis in the early stage, and have often found evidence of disease more marked in the fluoroscope than by auscultation and percussion. (When the disease has made progress the appearances in the fluoroscope are, of course, very conspicuous.) In the patient from whom the *diagram of tuberculosis* (Fig. 6) was made, the excursion of the diaphragm was more restricted than usual in an early stage of this disease, and the apex is darker.

Further, I have found suggestion of tuberculosis in some patients when auscultation and percussion had not revealed it, and whom I examined with the fluoroscope with reference to some other disease. This diagnosis was confirmed by the subsequent development of the case, the presence of bacilli, or by reaction to the tuberculin test.

The dark areas which are found in the lungs in pulmonary tuberculosis are not wholly due, I think, to a consolidation, for a marked congestion may give rise to similar appearances. In some patients whom I have examined at intervals of a week or two during some months I have seen these dark areas extend rapidly, and in others diminish in the same way, and as it does not seem probable that changes in the lung-tissue would take place so quickly as the increase and decrease of these dark areas would suggest, a congestion seems to be the natural interpretation of this relatively rapid alteration in the brightness of the lung. Further, in passive congestion of the lungs in mitral disease the lower portions of these organs may be darker than normal without corresponding physical signs; and, after rest and the administration of digitalis, the lungs soon become clear;[1] also in patients apparently suffering from debility, and who do not react to tuberculin, we may find a dark area in the lung that clears up after a rest of a week or two. The recognition of a congestion, especially at the apex, may be valuable in some cases, as an early warning of the beginning of tuberculosis, and it should certainly cause us to make a careful investigation, with this diagnosis in mind.

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[1] I examined normal lungs after they were taken from the body, with the fluoroscope, and found they were penetrated by the X-rays with the greatest ease. There was no marked difference in brightness between a fully and a partially distended lung. In life the lungs are brighter during full inspiration than expiration. This greater brightness is due to a diminished amount of blood in an equal volume of lung at this time. These observations, together with others bearing on this subject are referred to in my article entitled "A Study of the Adaptation of X-rays to Medical Practice." Medical and Surgical Reports, Boston City Hospital, January, 1897.

Among the cases of pleurisy with effusion that I have examined with the fluoroscope there were some in which a darkened area of the lung and a diminished extension of the diaphragm led me to suspect tuberculosis when it had not been detected by physical examination. This suspicion was afterward confirmed in certain cases by the tuberculin test or by the finding of the bacilli.

As the X-ray examinations in pulmonary tuberculosis come more into use I am convinced we shall sometimes recognize its presence earlier, and be less apt to overlook the disease in its beginning.

The following cases are chosen to illustrate some of the ways in which X-ray examinations may be useful in pulmonary tuberculosis.

In this patient (Case I) the signs in the fluoroscope were more marked than were the physical signs.

Case I.—Lawrence C., aged twenty-eight years. Entered the Boston City Hospital April 14, 1898. Mother died of phthisis; history of several hæmoptyses. March 31, coughed up blood several times; says he lost about a pint.

April 14*th.* Physical examination: Harsh respiration over both fronts, otherwise no physical signs.

14*th. X-ray examination:* Marked darkness over upper two-thirds of left chest. Excursion of diaphragm one and one-half inches on left side; two inches on right side.

17*th.* Physical examination: Respiratory sounds less pronounced than normal on both sides, otherwise no physical signs.

19*th.* No change in sounds by auscultation and percussion.

19*th. Second X-ray examination:* Similar to that made on April 14th, but more marked.

The patient was given one-half milligramme of tuberculin, and reacted to it, the temperature rising to 102.4° F. in eighteen hours.

Case II.—George S. B., teacher, aged thirty-two years. Had lost his mother and one brother by tuberculosis. Hæmoptysis June 5, 1897. In Dr. Folsom's service in Boston City Hospital for ten days. Nothing found in his chest. Subsequent to June had several slight hemorrhages. In July Dr. Smithwick found a few small, fine râles above the right clavicle.

September 17*th.* Dr. Smithwick found no râles at right apex, but thought he found a few in the right axilla; otherwise there were no physical signs. Said "the patient might be examined to-day without any signs of tuberculosis being detected;" no rise in temperature; no tubercle bacilli found, though the sputa had been examined several times. Dr. Smithwick brought the patient to see me on September 17th.

17*th. X-ray examination:* Right apex to lower border of second rib was darker than the left apex. Excursion of diaphragm on right side one and three-eighths inches; on left side two and three-eighths inches. This, together with what had gone before, led me to state I had little doubt the patient had tuberculosis.

October 3*d.* Dr. Smithwick found tubercle bacilli.

Bacilli had been found in this patient (Case III.) just before the X-ray examination was made, but it is of interest to compare the signs found in the fluoroscope with those by auscultation and percussion.

This patient has been under the careful observation of Dr. Buckingham, Dr. C. F. Withington, or Dr. H. Jackson for some months at the Boston City Hospital.

Case III.—L. B. C., aged twenty-nine years. Nurse in Boston City Hospital. Patient in Dr. Withington's service. Admitted May 11, 1898. For the past two months patient has had cough, with yellowish expectoration; about one week ago sputum was streaked with blood; slight dyspnœa after exertion. Patient thinks he has not lost weight or strength—no chilly sensation; no sweating; appetite fair.

May 11*th*. Physical examination: Heart not enlarged to the right or upward; apex in fifth space in nipple line; action regular; lungs normal save that breathing is somewhat jerky in places and fremitus is slightly increased all over the right chest. Otherwise physical examination was normal.

12*th*. Few râles at inner edge of left scapula; no difference in fremitus or in voice.

14*th*. An occasional, indeterminate râle here and there over the chest, not permanent in character; no abnormality in breathing or voice; resonance good.

15*th*. Breathing very little modified qualitatively. Occasionally râles as before, and after cough they are more numerous in right axilla than elsewhere. Tubercle bacilli found in sputum.

16*th*. I was asked to make an X-ray examination, which was as follows: Whole of right lung darker than left, *especially at base.* Excursion of diaphragm on right side seven-eighths of an inch; on left side two and five-eighths inches.

August 22*d*. Dulness at both apices and moist, bubbling râles; moist râles also present in both axillæ. Right apex, bronchial breathing, with increased resonance and fremitus. Process is diffuse in both lungs, but most marked in right.

X-ray examination: Right side much darker throughout than the left. Excursion of the diaphragm one-quarter inch on the right side and three-quarters of an inch on the left.

The fluoroscope afforded evidence of tuberculosis (Case IV.) where the physical signs were not conclusive.

Case IV.—Murdock M., carpenter, aged twenty-three years. Outpatient of Boston City Hospital, September 17, 1896. History of two hemorrhages; one four years ago and one a year ago. Now complains of pain in right chest, with slight cough and slight expectoration. Physical examination by Dr. Ames was negative, except for a few "clicks" at the junction of the second rib and the sternum on the right side and at left apex behind.

September 17*th*. The patient was brought to me for an X-ray examination, which was as follows: Two-thirds of right lung, beginning at apex, darker than normal, as well as apex of left lung. Excursion of diaphragm shorter and higher up than normal on the right side.

October 3*d*. Physical examination by Dr. Tenney: Slight dulness at left apex, back and front, with harsh respiration and increased voice sounds. It was learned at this time that the father and three brothers had died of phthisis.

Two examinations for tubercle bacilli had been negative.

In this case (Case V.) I was in doubt as to a diagnosis until after the X-ray examination.

Case V.—H. C., aged twenty-six years, entered the hospital January 24, 1898, in Dr. Shattuck's service. Family history negative. Had not felt well for three weeks. Headache, pain in back, anorexia; pain in stomach for two weeks. Had been in bed three days prior to entrance. Epistaxis four days before entrance; bowels regular; no cough. Pulse 80, respiration 20. Temperature 101° F. Heart: Right border at middle sternum; left border three centimetres inside nipple line; apex two centimetres inside nipple line; sounds normal. Lungs: Resonance and respiration good throughout; no chest symptoms whatever; spleen not felt; abdomen tympanitic; tenderness more marked on right side. Widal's serum-test was made eight times, always with a negative result; leucocyte count normal; no arsenic or lead in the urine.

February 12*th.* The patient was in my service from February 1st until his discharge. The finger-ends are markedly clubbed.

X-ray examination: Both sides of the chest darker than normal; no special area markedly dark, but rather the darkness was uniformly distributed. Excursion of the diaphragm: On the right side, one and three-quarter inches from upper border of the fourth rib to upper border of fifth rib; on the left side, one and one-quarter inches from middle of fourth rib to upper border of fifth rib.

25*th.* Patient is losing ground; has no pain, no cough, appetite good.

March 3*d.* Resonance: Both front and back unusually good; suggests emphysema rather than consolidation; no râles.

4*th.* Still losing weight; no improvement.

X-ray examination: Right side darker than left throughout. Upper two-thirds of left chest so dark that the ribs are barely seen, and only during full inspiration; diaphragm barely seen on inspiration on right side; on left side, seen only during inspiration.

7*th.* Resonance over both fronts is increased rather than diminished; respiration normal, expiration not prolonged; resonance and respiration over backs normal.

8*th.* Since admission the temperature has run an irregular course, and the patient has grown weaker and thinner. (Four days after entrance the temperature rose to 104½° F., varied for ten days from 99° F. to 102° F., then from 102° F. to 103° F. for six days; after which it was very irregular for several weeks, varying from normal to 103° F.).

10*th.* Respiration over a small area in right front, just below clavicle, is harsh; tactile fremitus slightly increased; no râles. Resonance not so good over right base behind as elsewhere, and respiratory sounds are diminished.

11*th. X-ray examination:* Right side darker than left during respiration; lung nearly as dark as liver; only a portion of left border of heart is seen. Diaphragm on right side moves one inch; on left side one and one-eighth inches.

20*th.* There has been much improvement; patient is now up.

April 4th. X-ray examination: Both chests clearer than at last X-ray examination; ribs can now be seen on both sides; both borders of heart seen; diaphragm on right side moves one and one-quarter inches; on left side, one and one-eighth inches.

19th. X-ray examination: Outline of the heart and all of the ribs seen clearly. Excursion of the diaphragm: Right side, one and three-eighth inches; left side, one and one-half inches.

Temperature has been between normal and 100° F. for nine days, and the opportunity was given to try the tuberculin test. One-half milligramme of tuberculin was injected; temperature rose to 102.8° F. eighteen hours later, and then fell to 99.5° F. Malaise; patient complained of feeling sore all over.

To recapitulate: This patient's illness began about January 1, 1895. He was first thought to have typhoid fever, but later this diagnosis was regarded with suspicion. During February he failed very much, had to be fed for about three weeks, was losing in weight and strength, and I gave a very unfavorable prognosis to his relatives. On March 8th the outlook for the patient's recovery was still less hopeful, but on March 20th he was up and dressed. No definite diagnosis was made until February 12th, when the diagnosis of acute miliary tuberculosis was made. On April 19th, as already stated in the physical examination, he reacted to the tuberculin test. The patient was discharged from the hospital on April 22d. He gained in weight and strength, although still rather thin; color good.

June 24th. Has gained three pounds in the past four weeks.

X-ray examination: Excursion of diaphgram: Right side, one and three-quarter inches; left side, one and five eighth inches.

In the following patient (Case VI.) the increase in density was detected earlier by the fluoroscope than by any other method in each lung successively:

Case VI.—John M., aged nineteen years, entered the Boston City Hospital in February, 1897. At entrance there was good resonance and respiration throughout both lungs.

March 12th. I made an X-ray examination because he had pericardial effusion, and found the excursion of two inches on the right side and two and one-half inches on the left side. (In health the excursion on the right side is usually greater than on the left.) From the apex of the third rib the lung was denser than on the right side. On the same day there were no signs by auscultation and percussion.

21st. The whole of the right side was darker than the left; the excursion of the diaphragm could not be followed on the right side; on the left side it was two and one-half inches, as on March 12th.

April 13th. He reacted strongly to tuberculin.

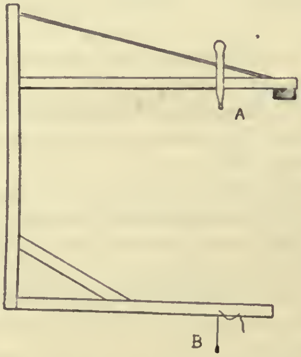
27th. The whole of the right side was dark, and the excursion of the diaphragm could not be followed. The left apex was darker than the normal from the apex to the fourth rib, and the excursion of the diaphragm was one and three-quarter inches. At this time there were no signs by auscultation and percussion at the left apex.

The patient had been about as usual in weight. There was almost no cough. Four months after entrance no bacilli had been found, although a number of examinations for them had been made.

In *pneumohydrothorax* when the patient is sitting up the fluid is seen in the fluoroscope to be level, as in a tumbler, but it becomes inclined and the heart is displaced. The level of the fluid changes as the patient bends backward and forward. When he is gently shaken the splashing of the fluid is clearly seen, and while quiet the waves made by the heart beat are very visible on the surface of the fluid. In the summer of 1897 I demonstrated this to Dr. Buckingham, who related what he had seen to other medical men, but they could not be induced to believe it was not a joke.

In *pneumothorax* the diaphragm on the affected side is much depressed, and its movement during respiration slight; the heart is in the portion near the median line, pushed to the other side.

FIG. 7.



Indirect plumb-line (one-sixteenth inch, equals one inch). A form of plumb-line to be used when the patient is lying on the stretcher, to determine the exact position for the Crookes tube when it is desired to place it directly under the point to be examined.

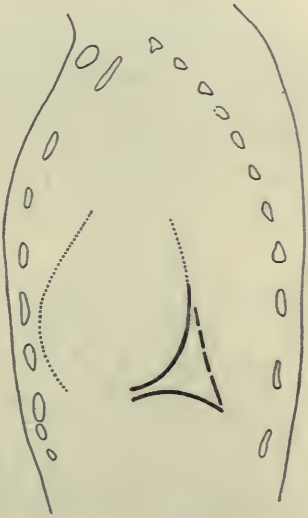
This instrument is made of strips of cedar one-eighth of an inch thick and one inch wide; there is a counterpoise of lead on the end of the arm beyond A; the vertical piece, from which the arms A and B extend, is made of two strips of cedar fastened at either end and separated three-quarters of an inch in the middle by a piece of cork. This is done to give stiffness.

A piece of thin wood about two inches square, with a depression in the centre (not shown in the figure) is placed on the patient, so that the depression is over the point to be examined, directly under which it is desired to bring the Crookes tube. The rounded point, A, is placed in the depression, and the rest of the apparatus swinging free, the weight B will hang directly under the point A, and the position for the anode is just under the weight B.

Let us now take up X-ray examination in diseases of the heart, and, first, recall that the normal heart is a very movable organ; that it varies in size and position within certain limits; that it is readily pushed out of place, and that the direction of its long axis is not always the same; in some persons the axis is more inclined, in others more vertical. The heart is seen to change its position during deep inspiration, being moved downward and inward.

Triangle. While looking through the body from side to side during deep inspiration, a light triangular area[1] (Fig. 12) comes into view, the sides of which are formed respectively by a part of the heart line, of the diaphragm line, and of the spine, or, rather, of what lies anterior to the spine. This last line is less defined than the two others. This triangle varies very much in size and in shape in different indviduals, and also varies according to the side on which the observer stands. It is smaller, when seen through the fluoroscope, on the left side than on the right side. In a patient with a transposed heart this condition was reversed, the triangle being smaller when seen from the right than from the left side. This was due to the fact that the transposed heart was nearer the right thoracic wall than is the normal heart, and it is obvious that the nearer the heart to the side of the body where the observer stands with the fluoroscope the smaller will the triangle appear.

FIG. 8.



Triangle. The outline of the body and the ends of the ribs have been traced from an anatomical plate which represents a section of the body through the left parasternal line. The heart-line and the outlines of a portion of the diaphragm and spine, or rather what is in front of the spine (this third line is less defined than the other two) form the triangle, and were drawn by means of the fluoroscope on the left side of a patient during full inspiration, and then sketched in about the proper position on the drawing from which this diagram is made. This triangle is usually closed on the anterior side, although it did not happen to be in this patient. It will be seen that the outline of the heart is indicated partly by a full and partly by a dotted line. The full line shows the extent of the border usually seen in the fluoroscope in health, the dotted line the additional amount seen in this special individual in health.

The position of the heart is seen to be changed in diseases affecting the lungs, pleura, or bloodvessels, or by conditions in the abdominal cavity pressing the diaphragm up.

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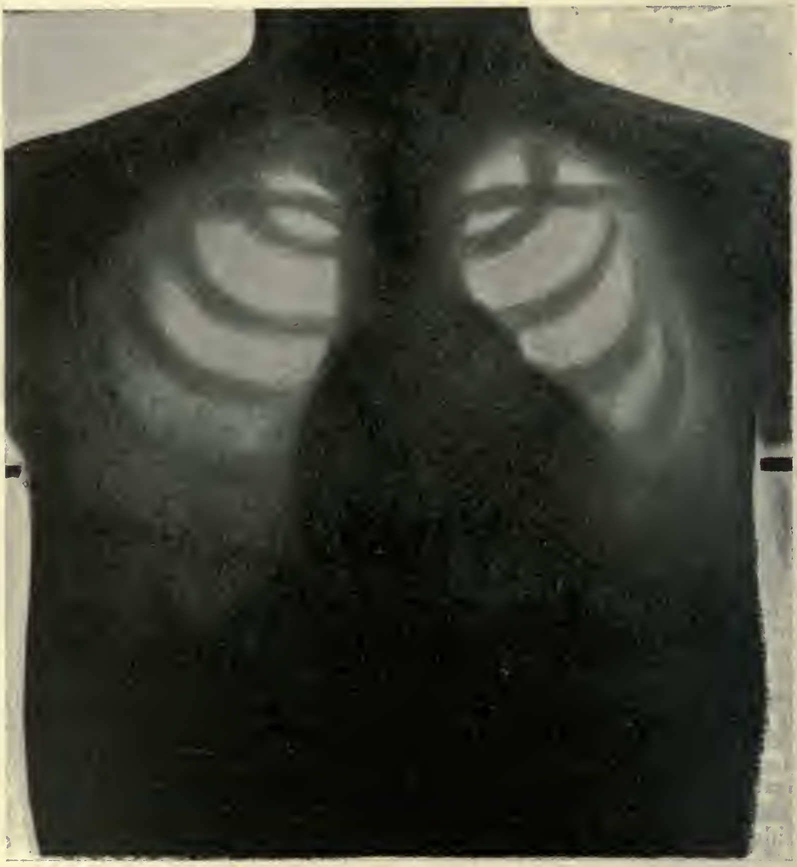
[1] Described in my paper entitled "X-rays in Medicine," read at the annual meeting of the New York State Medical Society, and published in their Transactions and in the Medical News, May 14, 1898.

A lessened movement of the heart in deep inspiration may be seen to occur in emphysema, or where the pleura or pericardium is adherent. In one patient I saw the apex tilted up during deep inspiration instead of moving down. This was due, I suppose, to adhesions. We may thus follow some of the effects on the heart of changed conditions in its vicinity. A diminished or an abnormal movement of the heart during a deep inspiration may be evidence of adhesions.

FIG. 9.



Passive congestion or œdema of the lungs.

Warning may be given by a passive congestion or œdema of the lungs of a serious condition of the heart or kidneys. Fig. 1 represents this condition, though it may be more marked than is shown in this diagram. The lower portions of the lungs are dark, the outlines of the diaphragm cannot be seen, and only a portion of those of the heart. By such appearances as these I was led to warn one of my patients, who had renal disease, to put his affairs in order; he died suddenly within three months. By auscultation and percussion I had not appreciated the serious condition of his lungs.

Œdema of the lungs may be distinguished from early tuberculosis by means of the fluoroscope, as in the former the lower part of the chest on both sides is dark, whereas in early tuberculosis the darkness is usually on one side and at the apex.

In *pericardial effusion* the outlines of the heart may be obliterated, and instead of the usual pulsating heart we see a much larger dark area. The size, shape, and position of the pericardial effusion, and the fact that the outline of the pulsating heart cannot be seen assists in making the diagnosis. New growths about the heart and also in other parts of the thorax may be seen.

An enlarged heart, as in arterio-sclerosis or valvular disease, may be recognized in the fluoroscope, and also a heart smaller than normal, with which anæmia is sometimes associated, may be readily seen in the fluoroscope. It is, I believe, important for the physician to be aware of the existence of a small heart in any of his patients.

A transposed heart may easily be seen in the fluoroscope. During my recent service at the Boston City Hospital my house physician asked me to explain to him the conditions present in the heart of a patient who had been admitted the day before. I examined the patient, but withheld my opinion until I had made an X-ray examination, as the heart-sounds and murmurs were unlike any I had ever heard. On examination with the fluoroscope I found that the patient's heart was transposed; the left ventricle could be seen beating to the right of the sternum and the right auricle was on the left of the sternum. When the patient was turned around and the fluoroscope was placed on her back the transposed position of the heart was also very evident.

To arrive at a knowledge of the heart's condition in disease it is of importance to know its size as nearly as possible, and this can obviously be satisfactorily accomplished by means of the fluoroscope, except where pathological conditions partly obliterate the cardiac outlines, as in pleurisy with effusion or œdema of the lungs, for instance. Of course, in very stout patients or those with pulmonary emphysema it is often impossible to determine the size of the heart by percussion, but stoutness is no serious obstacle to an X-ray examination, and emphysema is a positive advantage. In fifty-eight patients who were not stout and had no emphysema—that is to say, in whom the conditions were not unfavorable for the use of percussion—I compared the size of the heart as obtained by percussion with that obtained by an X-ray examination. The percussion lines were drawn on the skin in blue and the other lines in black. The outlines drawn by the aid of the fluoroscope were, of course, more complete than those obtained by percussion. The percussion lines varied considerably, in a portion of the cases—in some patients an inch or more—from the size of the heart as seen in the fluoroscope. Sometimes they indicated a smaller and sometimes a larger heart than the reality. Twenty-two of the fifty-eight patients had organic disease of the heart, and a more frequent disagreement in regard to one or both borders of this organ, as obtained by percussion on the one hand, and an X-ray examination on the other, was found among them than in the remaining thirty-six cases who were suffering from other than cardiac diseases. I am therefore satisfied that in some, particularly in cardiac cases, we have not determined with exactness the size of the heart by percussion, and unfortunately we cannot tell in which of our patients percussion will fail in accuracy. It is well, therefore, that we should realize this in those cases in which we desire precise information about the size of the heart.

In a patient with aortic insufficiency with a large left heart, I could see in the fluoroscope the great left ventricle making a large excursion between systole and diastole, and appreciate better than ever before what an extraordinary quantity of blood is delivered into the aorta with each systole in order to make up for the large amount which was sure to leak back during each diastole. Further, it could be distinctly seen that the excursion of the left side of the ventricle was diminished when a full breath was held, as then the heart was compressed by the lung. I refer to this patient (but it should be stated that in aortic insufficiency the appearances may be unusually marked in the fluoroscope) in order to indicate to you that it is now possible to examine more completely than hitherto patients who have or are feared to have cardiac disease.

To carry out this new method of examination[1] properly requires large

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[1] I have found the following a convenient method of making X-ray examinations with an open fluoroscope screen:

The room should be dark, and even the light which comes from the Crookes tube must be excluded; this can be done by wrapping the tube in black velvet or enclosing it in a wooden box. Any other source of light, as the spark gap, should also be excluded. The fluorescent screen, twelve by fourteen inches, covered with a sheet of thin, perfectly clean glass, or a waterproof film, is then put on the patient's chest. With a lithographer's pencil (if the surface of the film is ground an ordinary pencil may be used) the outlines of the heart, for example, may be traced on the glass, and when a record is desired they may be copied by tracing them on paper. After cleaning the glass with alcohol it may be used again. The patient may be examined sitting up or lying down. My patients at the Boston City Hospital were brought into the X-ray-room on a stretcher which fitted on to the supports attached to the stand of my X-ray machine. If a patient is too ill to be moved he cannot very easily be examined, although that is possible by means of a portable X-ray machine. The anode of the Crookes tube should be at least two feet away from the patient when the thorax is examined, and usually under the point where the median line is crossed by a line joining the nipples; this position should be determined by plumb-lines. The median line is obtained by sighting from a permanent and expensive apparatus and experience in using it with a considerable number of patients. There need be no fear of injury to any individual if the examinations are properly conducted. At the Boston City Hospital I have made more than two thousand X-ray examinations, and no one has received any injury or even inconvenience from them. It is easy to burn the fingers if they are put too near a candle, but it is not therefore dangerous to read by its light.

This new method of examining our patients has now passed the stage of mere interest and novelty; and in its own special field, if suitable apparatus is used, can be counted among our trustworthy aids to diagnosis.

A CRITICAL SUMMARY OF RECENT LITERATURE

ON

CHRONIC CONTINUOUS GASTROSUCCORRHŒA.

By D. L. Edsall, M.D.,
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The report by Reichmann[1] that he had discovered that continuous secretion of gastric juice was present in a man under his care, and that this continuous secretion seemed to be the cause of all his symptoms, followed by records of many similar cases by Riegel,[2] Jaworski and Gluzinski,[3] Honigmann and Reichmann,[4] excited criticism from Schreiber,[5] who denied that continuous secretion was abnormal, and reported that he had in a series of normal individuals obtained gastric-juice through a tube when they had fasted over night. Such a direct denial

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plumb-line that is fastened to the middle of the support upon which the head of the stretcher is placed to another fastened to the support at the foot in the same way. The other line is determined by putting a string seven or eight feet long, with a weight on either end, across the chest from nipple to nipple, that is to say, on a level with the fourth rib. The line hangs down on either side of the patient, and the proper point is obtained by sighting as before from weight to weight; the anode may then be brought into line with the weights. The patient should be lying on his back when he is examined if the plumb-lines are used, but can be afterward turned if desired. In this reclining position the patient is perfectly comfortable and his strength is not taxed. I tested the correctness of the plumb-lines as a guide to the position of the tube by making two successive examinations, the patient getting up and the tube being removed after the first examination, and both patient and tube being rearranged for the second. The outlines of the heart and ribs traced by means of the fluoroscope in these two examinations differed only by the width of the line. An instrument which is a form of plumb-line that I have devised for determining the exact position of the tube when it is desired to place it directly under the point to be examined is shown in Fig. 7. This is especially useful where the median line is not available as a point of reference. I have used this instrument from time to time for more than a year.

I have described the method of examination in my article entitled "A Study of the Adaptation of the X-rays to Medical Practice." Medical and Surgical Report of the Boston City Hospital, January, 1897.

of previous physiological teaching and of the existence of gastrosuccorrhœa led to much work for and against Schreiber's view, Rosin[6] and Martins[7] supporting him, while Hoffmann, Pick, and Riegel[8] offered the results of their experiments to show that Schreiber's results were not usually obtained and were probably due to the irritation of the stomach-tube. Strauss[20] believed that previous writers had often called any fluid expressed from the fasting stomach gastric juice, and that by a critical examination of the records one could exclude all but about twenty of the positive results recorded. The decision of the question was of importance, Riegel and his followers holding that the hypersecretion interfered with the digestion of starches and caused gaseous fermentation and consequent atony of the stomach, and that it was itself an evidence of excessive excitability of the gastric mucous membrane, while Schreiber and his supporters contended that continuous secretion is normal.

Not long since Gintl[9] recorded the largest series of tests similar to those of Schreiber. He examined eighty individuals, and made altogether 189 tests. The result was wholly negative in twenty-six. In 146 there was less than 5 c.cm. Thirty-nine times there was from 10 to 50 c.cm., and three times from 50 to 100 c.cm. All the latter cases were subjects of gastric disease. In all cases the tube was allowed to remain in for from ten to fifteen seconds, and the patient made vomiting efforts. Most recently Riegel[10] has given the broadest and fairest consideration of the question. He repeated his former argument that even though in some apparently normal persons small quantities of gastric juice are obtained in the early morning through a tube, this offers no proof of a constant normal secretion, for the irritation of the tube may suffice to produce small quantities. Collecting the results of all investigations, he finds that only 6.75 per cent. of all supposedly normal cases examined have shown more than 20 c.cm. It is doubtful, too, whether the result would have been positive in many of these had the test been carried out more than once, and the result of a single introduction of the tube when the patient is unaccustomed to it cannot be considered final. He speaks of continuous secretion only when repeated tests give the same result, and more than 50 c.cm. of gastric juice free of food remnants is repeatedly removed from the fasting stomach. If such an amount is found, however, he considers it an evidence of a pathological condition, even though the patient has no symptoms. We have, he says, no more right to state that such an unusual state is normal to the individual than to consider that a glycosuria accidentally discovered is physiological. He agrees with Fleiner[11] and Westphalen,[12] that the use of irritant foods, common in certain localities, may explain the greater frequency of the disease in these places; but he holds that the irritant foods have then induced an abnormally excitable condition of the gastric mucous membrane. Hyperchlorhydria often gives rise to few or no symptoms, and Riegel considers continuous hypersecretion an aggravation of hyperchlorhydria.

These conclusions may be accepted as fair, and for the present final. Another contention had arisen, however, originated by Schreiber's[5 13] theory that the fluid found was always the result of stagnation. v. Engelhardt believed this true, and had always found atony present.

Boas[14] had similar views, and supported them by feeding subjects of gastrosuccorrhœa by the rectum for several days. He found that this caused the morning secretion to disappear, and considered the result further evidence that continuous secretion was due merely to retention in the stomach and continuous irritation. Hemmeter[15] has recently repeated these experiments with the same result. They cannot be said to prove the point, however, since the theory of Reichmann, Riegel, and their followers had always been that the continuous secretion was due to excessive reaction to the irritation of the stomach contents, which produced continuous instead of temporary secretion. If food were entirely withheld from the stomach such irritation would certainly cease, and these experiments are as good an argument on one side as on the other.

Reichmann's[4] second case and one of Honigmann's were early examples of the existence of this condition without signs of gastrectasia. Riegel[8] stated that he had frequently seen the condition without any food stagnation. Debove[16] made a similar report, and Reichmann,[4] Bouveret and Devic,[17] and Roux[18] have all reported cases in which there were neither visible food remnants nor peptones in the fluid removed in the morning. A case has recently been published by Strauss[19] in which repeated examinations of the stomach before breakfast yielded always from 135 to 200 c.cm. of fluid which contained free HCl and was highly acid. Neither macroscopically nor microscopically could any food particles be found. Currant-seeds, introduced the evening before, had entirely vanished, and there was no gaseous fermentation of the fluid after forty-eight hours' standing in the oven. Tests for sugar and starch were entirely negative, but the biuret test was positive. The stomach was of normal size and shape, and in normal position. This and earlier cases are sufficient evidence that the condition may exist without any motor weakness, and the previous reports would seem to have negatived already Hayem's[21] enthusiastic support of the theory that gastrosuccorrhœa is due purely to obstruction to the passage of the stomach contents. In his first communication he divided the cases into the true and the false. The former, which he considered more frequent, he attributed to obstruction usually from ulcer and peripyloritis. If cases show severe vomiting, marked atony or dilatation, violent peristaltic movements, or many remnants of food, they should not be classed as true gastrosuccorrhœa. The true examples of this affection are, he said, less severe cases. They rarely vomit, and show but slight atony, and no gross particles of food are found in the morning contents. Shortly afterward[22] he retracted this, and decided that gastrosuccorrhœa without obstruction does not exist, this statement being made on the basis of the conditions found in two cases which had shown the clinical syndrome and which he had considered to be due to pyloric spasm. Gastro-enterostomy was seen in both cases, and in one there was found inflammation and thickening of the walls of the duodenum, which he thought had probably caused obstruction. In the other there was a fibrinous exudate on the peritoneal surface of the duodenum and some adhesions of this portion of the gut. The duodenum was not opened.

Hayem at once decided that an incomplete obstruction below the pylorus is the cause of all cases not the result of pyloric stenosis. He advised operative interference in all cases showing the syndrome. These conclusions were surely unjustified when the lesions had been but imperfectly investigated, and but two cases were advanced in support of his view, and Robin[23] answered vigorously, opposing routine surgical treatment and insisting that pyloric spasm is the cause of many cases. He believed that operation is indicated only when there is organic stricture or a permanent and resistent spasm of the pylorus.

The diagnosis between atony and intermittent spasmodic stenosis, on the one hand, and permanent obstruction on the other, might be made, he said, by determining the consumption and outgo of nitrogen for a day or two. If permanent stenosis were present only about 50 per cent. of the nitrogen ingested would be recovered in the urine and feces, while in cases of atony or temporary pyloric spasm the entire amount would be regained. Unfortunately this is merely learning in a roundabout way that stagnation exists or does not, but Robin's references to Doyen's operative experience are important. In 100 gastric operations Doyen had seen sixty-one non-cancerous cases, and of these forty-six were spasm of the pylorus. Twenty-four of these were the result of the irritation of ulcers situated at a distance from the pylorus, but twenty-two were due purely to excessive sensitiveness of the mucous membrane. Robin reported five cases which he believed belonged to this latter group, all of which were cured by medical measures.

Hayem[24] has, however, continued to teach that the condition is due to pyloric or subpyloric stenosis. He reports another case in which operation had been performed for gallstones and in which symptoms of hypersecretion appeared subsequently. He attributed the hypersecretion to local peritonitis due to the passage of gallstones, and causing incomplete stenosis of the duodenum; and states that a diagnosis of incomplete subpyloric stenosis may be made if bile is constantly found in the fluid expressed from the stomach in the morning. His views have not been subscribed to by others. Mathieu and Laboulais[25] agree with him in believing that many cases are due to ulcer, which causes motor weakness both from a resulting stenosis and from destruction of a portion of the wall of the stomach. Such cases are, in their experience, grave ones, while in the milder forms the ultimate stasis is the result of the hypersecretion, and it is of extreme importance to recognize the excessive excitability of the mucous membrane and to treat it. Pyloric spasm has come into prominence since Doyen emphasized its importance so strongly. Linossier[26] recognizes its importance, and Carle and Fantino[27] state that when the diagnosis of gastrosuccorrhœa is made they always suspect an organic or spasmodic stricture at the pylorus. They record nine cases which they diagnosed spasmodic stricture, because of the occurrence of attacks of forcible vomiting and violent peristaltic movements, while, when operated upon, there was no organic stenosis at the pylorus or below, and yet the stomach walls were hypertrophied. They consider Doyen's figures extreme, but believe that pyloric spasm is an important condition, and one that frequently may demand operation. As to the effects of operation upon the gastric secretions, they direct attention to the fact that in seventeen of eighteen cases operated on for benign stenosis the excess of HCl gave place to absence of the acid. A further illustration of the present-day tendency to operate in many gastric affections formerly considered fit for medical treatment only is seen in the very positive advice given by Strauss,[19] who considers operation indicated in all cases of gastrosuccorrhœa, whatever the underlying cause, if the use of proper diet, lavage, alkalies, atropine, and like measures has not resulted in distinct relief. He records a case of continuous gastrosuccorrhœa with gastroptosis and pyloric stenosis, but without stagnation of food, in which gastroenterostomy was done. The patient, who was gravely ill, died of shock, but Strauss urges operation in order to lessen the irritation by overcoming the prolonged retention of gastric contents, which always occurs in these cases. His view seems extreme, but it is less so than that of Hayem's, and is supported by Carle and Fantino.

Strauss' report contributes further knowledge concerning the condition of the gastric mucous membrane in this and similar conditions. The principal cells of the tubules seemed to have disappeared in part and to have been replaced by large numbers of the border cells. The epithelium was degenerated. There was marked round-cell infiltration, leucocytes being collected in especially large numbers about the necks of the glands. The connective tissue was increased and the glands were elongated and distorted, the vessels wide and tortuous. These changes are similar to those found by Korczynski and Jaworski,[28] Hayem,[29] Cohnheim[30] and Hemmeter,[31] in cases of hyperacidity, and by Popoff[32] in his important experimental work in the production of gastritis with hyperchlorhydria. Hence, it seems to Strauss that we may justly attribute the hypersecretion to these changes, which may be considered to be due to the excessive irritation.

The evidence that we have at present is sufficient to justify the conclusion that chronic continuous gastrosuccorrhœa exists and may be due to no organic change in the stomach that is discoverable clinically. Œstreich's[33] case of hyperchlorhydria of eleven years' standing, without changes in the gastric tubules, give some anatomical ground for believing that hypersecretion may at times be a pure neurosis, and clinical evidence to the same effect is at hand. Judging from what is now known, however, there is little doubt that there are generally anatomical changes in the mucous membrane, and atony or obstruction, with retention of food, ulcer, or some other anatomical cause of irritation, is usually present. The gastrosuccorrhœa is due to changes in the mucous membrane, which may be primary and finally produce ulcer or gastrectasia; or the latter may have given rise to the excessive irritation of the glands, and this to the gastrosuccorrhœa. There has been much earnest contention that gastrosuccorrhœa is not a disease, *sui generis*—an unnecessary contention, it would seem, since for years no one in authority has claimed that it is. Any mere alteration in the character or quantity of the gastric-juice is no more deserving of being called a disease than is, for instance, a polyuria.

Since Bouveret and Devic[34] claimed that tetany occurs as a complication of gastric disease only in association with hypersecretion, it may be noted that there has recently been added proof that this is not necessarily so, and that this supposed evidence of the reflex origin of gastric tetany, through irritation from excess of HCl, cannot be considered valid. Kuckein[35] records a case with absence of HCl, and still more recently Albu[36] reports a similar instance. The latter case is notable as the only certain instance of cure of gastric tetany by operation. Resection of the cancerous pylorus resulted in relief of the gastric distress, and the tetany disappeared and did not return. Albu, therefore, adds attacks of tetany to the list of indications for operation in gastric disease, but his advice must be justified by repeated successes before operation can be regarded as a proper course in a condition which is already so grave as is gastric tetany, and which is as yet by no means proven to be frequently subject to relief by operation.

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REVIEWS.

AN AMERICAN TEXT-BOOK OF DISEASES OF THE EYE, NOSE, AND THROAT. Edited by G. E. DE SCHWEINITZ, A.M., M.D., and B. ALEXANDER RANDALL, A.M., M.D., Ph.D., of Philadelphia. Illustrated with 766 engravings, 59 of them in colors. Philadelphia: W. B. Saunders, 1899.

A FEW years ago it was the exception to find a physician who devoted himself wholly to treating diseases of the eye or of the ear, or of the nose and throat; but as the knowledge of each of these subjects became extended, and the profession at large as well as the laity came to understand the importance of special treatment when any of the organs of the special senses were involved, the workers in these subjects found that if they would be familiar with the literature of their specialties and do full justice to the rapidly increasing numbers of those who consulted them, they had best become strict specialists and devote themselves to the study and practice of but one subject. As a consequence of this divorce, which was rendered necessary by the increase of our knowledge in all phases of medicine, the members of the different specialties formed newer and more natural associations. The ophthalmologist found that he was really of closer kinship with the neurologist or even with the clinician than with the aurist or laryngologist, and increased his knowledge in these fields. The rapid strides of pathology and bacteriology had also to be kept pace with, and the passing of the old combination of specialties was the inevitable consequence. In the smaller towns, however, where the number of people is limited and the scope of the specialist curtailed, it is still the custom to combine the three, and we fancy that the authors of the present work had this particular class of specialists in view when they decided to publish the work conjointly.

While many may doubt the expediency of including in one volume material which is devoted to the exposition of the three specialties, which, though formerly connected, are now generally and quite properly divorced from one another, no one, we venture, will gainsay the general excellence of the work which it is our pleasure to review, for the volume is a most delightful exposition of the subjects. The different articles are complete, forceful, and, if one may be permitted the term, " snappy," in decided contrast to some of the labored but not more learned descriptions which have appeared in the larger systems of ophthalmology. Being all from the pen of American authors, they have not suffered from the misinterpretations of translation, which, despite the greatest care of the translators, is almost inevitable when the authors are of different nationalities.

As a result of a careful study of the work, the reviewer is impressed by the excellent subdivision of the subjects and by the admirable judgment which has been shown by the authors in their choice of collaborators. As stated in the preface, while the work is essentially a text-book, it may truly be said to be a volume of reference, containing a series of articles written by men who are authorities on the subjects portrayed by them; it is a tribute to the progress of American medicine, and is an excellent index of the familiarity which the members of the different specialities in this country have with the literature of all lands which bears upon their particular subject.

The first article serves as an excellent introduction to the work, being from the able pen of George A. Piersol, M.D., upon the embryology, anatomy, and histology of the eye. The subject is handled very carefully and conscientiously, and in the section which deals with the embryology of the eye, a familiarity is shown which indicates much patient research by the author. The next two articles, that on general physiology of vision, by Albert P. Brubaker, M.D., and that on general optical principles, katoptrics, dioptrics, physiological optics, by William S. Dennett, M.D., and Colman Ward Cutler, M.D., while devoting less space than is usual to this phase of the subject, contain all that is necessary for a clinical exposition. The next article, examination of the patient and external examination of the eye, functional testing, and one further on, upon operations, preparation of the region of operation, the instruments, and the dressings, anæsthesia, are by Dr. G. E. de Schweinitz, and are written in this well-known author's terse but lucid style. The next two articles upon the ophthalmoscope and its use, the normal eye-ground, by B. Alexander Randall, M.D., and methods of determining the refraction of the eye, ophthalmometry, ophthalmoscopy, skiascopy, optometry, the use of mydriatics, by Edward Jackson, A.M., M.D., complete the functional examination of the eye, and are three of the most important and most ably presented in the book.

The reviewer confesses to a degree of disappointment in Dr. John E. Weeks' article on diseases of the conjunctiva, for he hoped that this well-known pathologist and bacteriologist would have discussed the subject somewhat more fully from these stand-points. No doubt, however, the importance of impressing the student with the common varieties of conjunctival inflammation, from a clinical stand-point, compelled him to curtail a discussion which might be too scientific for his readers.

The introduction of a chapter upon amblyopia, amaurosis, and disturbances of vision without ophthalmoscopic change, by Casey A. Wood, M.D., is an innovation in a work of this kind, and has been happily disposed of by its author.

Dr. Randolph's article on diseases of the iris, ciliary body, and cho roid, sympathetic inflammation and irritation, and Dr. Duane's article on movements of the eyeballs and their anomalies, as might be expected from the previous communications which have been made by these authors upon the same themes, are most excellent expositions of these subjects.

The department of ophthalmology is concluded by an appendix containing five sections on subjects of recent development in ophthalmic surgery, which are not usually found in text-books, but which form valuable adjuncts to the work.

The majority of the articles on the ear, nose, and throat are excellent, and, taken as a whole, are a very meritorious collection, giving a very fair idea of our knowledge of these subjects at the present time.

The anatomy, embryology, and histology of the ear, by B. Alexander

Randall, M.D., is presented in a clear and concise manner. The cuts, especially the metal casts showing the intricate middle-ear spaces are especially good, most of them being original with the author. General therapeutics of the ear, by John E. Sheppard, M.D., is an excellent exposition of this subject, but the author's recommendation of a solution of caustic potash for the purpose of saponifying and softening epithelial masses in the external auditory canal is not altogether free from danger.

The illustrations of injuries and diseases of the drum-head are excellent, and the text is also good. The propriety of employing the eustachian bougie in chronic otitis media with eustachian obstruction is, however, questioned by many authorities, especially when accompanied by the local application in the tube of silver nitrate solution (gr. lx. to f℥j). Furthermore, the several methods of massage of the ossicles in chronic otitis media, a treatment which often gives excellent results, is scarcely mentioned, whereas the—as yet—doubtful intratympanic operations are given a prominent place.

The chapter on the complications of tympanic inflammation, by Herman Knapp, M.D., is well written, and probably represents the latest teaching on that subject. Operations for mastoid involvement are particularly well described and illustrated. The rest of the chapter on operations could be improved by a few more cuts.

The anatomy of the upper air-passages, including histology and embryology, by the late Harrison Allen, M.D., and Arthur A. Bliss, M.D., and the physiology of the upper air-passages, by Walter J. Freeman, M.D., are well written and cleverly illustrated. The article on methods of examination and diagnosis in diseases of the nose and throat, by John W. Farlow, M.D., seems clear, but could be improved by more cuts illustrating instruments and technique.

The chapter on therapeusis and diagnosis, by George A. Leland, M.D., accentuates a fact that is too often overlooked, namely, that many nose and throat affections are simply manifestations of constitutional diseases demanding constitutional rather than local treatment. Acute and chronic affections, by William E. Casselberry, M.D., and Morris J. Asch, M.D., are well described, the author of the latter chapter illustrating and explaining his own operation for deviated septum very clearly. His claim that the one procedure is suitable for every kind of deviation is certainly a very strong point in its favor. The chapter on diseases of the tonsils, palate, and pharynx, by James Edward Newcomb, M.D., is one of the best in this section of the book, affections of the tonsils being exceptionally well described.

The chapter on disease of the accessory sinuses of the nose, by Robert Cunningham Myles, M.D., is well illustrated. In the treatise on diphtheria of the air-passages, by J. H. McCollom, M.D., the treatment is clearly defined and the illustrations sufficient; antitoxin is given the prominent place it undoubtedly deserves.

The cuts in the article on laryngeal tuberculosis, by E. L. Shurley, M.D., are very good, and show the pathological changes which occur in that affection remarkably well. The text also is good.

Neoplasms and neurosis of the upper air-passages, by Jonathan Wright, M.D., are treated in an exhaustive but concise manner, and are thoroughly modern. The concluding chapter on operations, by John O. Roe, M.D., is excellent. W. C. P.

PROGRESSIVE MEDICINE: A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES, AND IMPROVEMENTS IN THE MEDICAL AND SURGICAL SCIENCES. Edited by HOBART AMORY HARE, M.D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia. Octavo, handsomely bound in cloth, 490 pages, 28 illustrations, and 3 colored plates. Philadelphia and New York: Lea Bros. & Co., 1899.

THE editor of the series of volumes known as *Progressive Medicine* truthfully says in his preface that "the busy practitioner needs a well-told tale of medical progress in all its lines of thought, told in each line by one well qualified to cull only that matter which is worthy of his attention and necessary to his success. He needs an article which can teach him all that a master of a specialty knows of a year's work, and he does not need an immense quantity of material which, however interesting it may be from its novelty, possesses no intrinsic merit." This is the standard which Dr. Hare erects for himself, and it may be said in the beginning that the first volume of the series fulfils the requirements. American physicians have not been derelict in book-making, but they have not kept pace with their European confrères in the production of year-books, annual reviews, and periodical digests, such as Virchow's *Jahresbericht*, Schmidt's *Jahrbücher*, the *Jahresbericht der Neurologie and Psychiatrie*, and many other well-known critical reviews in the German, French, and English languages. The time, therefore, was very opportune for the presentation of such a work as the one under consideration. No one will be likely to deny that such productions are invaluable, not alone for the busy practitioner, but for the teacher and the maker of medical literature. At the present day it is wholly beyond the intellectual capacity of any individual to keep abreast with current medical literature, so enormous has it become and so widely scattered is it in almost innumerable publications. And although it may be said that, as a rule, the real advances in the medical sciences are published in a comparatively small number of medical journals, nevertheless special journals are so numerous that it is quite impossible for one who takes an interest in the different departments of the medical sciences to keep abreast of what is being done except through some such channel as *Progressive Medicine.*

This series will undoubtedly appeal to a very large number of the medical profession, particularly as the first volume merits unreserved approbation. Six subjects are considered, and each one by a physician whose previous contributions have associated his name with the respective subject in medical literature. The Surgery of the Head, Neck, and Chest is taken by J. Chalmers Da Costa; Diseases of Children, by Alexander E. Blackader; Pathology, by Ludvig Hektoen; Infectious Diseases, by William S. Thayer; Laryngology and Rhinology, by A. Logan Turner; and Otology, by Robert L. Randolph. Each of these sections is well done, and it would be invidious to compare them; but the reviewer should be permitted to say that the sections on pathology and on infectious diseases are altogether the best in the book. Dr. Da Costa has perhaps told the story of the progress in the surgery of the head, neck, and chest in a more personal way, thus meeting one of the objects of the editor, than has any of the other contributors. His review of the surgical treatment of exophthalmic goitre is particularly good. The surgical treatment of epilepsy is given much more space than it is entitled to, particularly when contrasted with abscess of the brain, which is not handled so satisfactorily as most of the other subjects considered in this section. The most conspicuous shortcoming of the latter is the absence of any statement concerning the proven relationship of the segment of the middle ear, from which the pyogenic process starts to set up abscess of the brain, to the location of the abscess.

The section on Diseases of Children is very complete, but rather verbose. It could have been boiled down with great advantage. In this section a number of topics are taken up in detail which receive adequate consideration in other parts of the book. For instance, hydrocephalus treated by intracranial drainage, and abscess of the brain, are considered by Dr. Da Costa and by Dr. Blackader, both of them giving digests of the same contributions, while lumbar puncture, to which two pages are given in this chapter, is adequately described by Dr. Thayer on page 379. It is a little discouraging to read that "on the subject of the gastro-intestinal disorders of infancy many communications have appeared in the medical literature of the past year, but no important additions to our knowledge have been made," and then to have to wade through ten pages devoted to this subject. But, all in all, this section is very complete and reflects credit upon the author.

Dr. Hektoen has gone over the literature of the pathology of infection and pathogenic micro-organisms in an extremely complete and painstaking manner. Two colored plates and a number of illustrations add to the instructiveness of this chapter. Of course, it was to be expected that Dr. Thayer would give a thorough and instructive résumé of malarial fever, considering his recent excellent book on this subject, and the reader will not be disappointed. The pages on bubonic plague and on typhoid fever are deserving of particular mention and favorable commendation.

The only criticism that the section on Laryngology and Rhinology by Dr. Turner deserves is that the compiler has failed to put a personal stamp on the matter as distinctively as some of the other writers. Moreover, this chapter could have been advantageously compressed. Dr. Randolph gives an adequate review of the advances in otology, and particularly of the contributions that have been made to the anatomy and physiology of this organ. Here some lapping-over occurs, such as in infectious sinus thrombosis, which received consideration from Dr. Da Costa. The volume is provided with a moderately complete index, in which, however, a number of errors were detected on casual use. All in all, the volume deserves great praise, and will undoubtedly receive a hearty welcome. J. C.

LA THÉRAPEUTIQUE DES EMPYÈMES. (TREATMENT OF EMPYEMA.) Par le DOCTEUR E. CESTAU, Ancien Interne des Hôpitaux de Paris. Pp. 394. Paris: Georges Steinheil, 1898.

THIS work is divided into two parts devoted to (1) the recent and (2) the chronic empyemas. After a preliminary study of causation and bacteriology, the general evolution of empyema due to the pneumococcus, streptococcus, the tuberculous, the gangrenous, and the rarer varieties due to the bacillus of Friedländer or of Eberth, are presented. Next the operative procedures, the different varieties of thoracentesis, of aspiratory drainage, of pleurotomy, each discussed under the titles of its proposer, are briefly and satisfactorily described. To this point we find simply a *résumé* of existing literature, covering 100 pages. The real value of the work lies in the next one hundred and fifty pages. Of these fifty are occupied with the consequences and accidents after operation. Aside from the accidents of operation, properly so called, and which are sufficiently well described in text-books, such accidents complicating infectious (abscess of brain) or nervous accidents, described under the clinical forms of syncopal, convulsive or hemiplegic, explained as toxic, mechanical or dynamic, are fully presented, and their treatment and prophylaxis briefly outlined. To the results of, and indications for, operations, an entire division is assigned. Here, again, thoracentesis, aspiratory drainage, and pleurotomy are taken up and their respective value in given cases determined. Still further, the indications from the bacteriological and anatomical stand-points are considered. On substantially the same plan the chronic empyemas receive attention. It is not often that a monograph so thoroughly satisfies the reader as this has done. The extensive acquaintance with existing literature as it has been made by the French, German, British, and, by no means the last or least, the American workers in the field, the broad view of the subject independent of school or theory, the carefully studied deductions all tend to make this a work of value to the physician as well as the surgeon. He who wishes to know the subject as it is to-day should study this book, and he who believes that one method is applicable to all kinds and conditions of empyema will learn that certain ends are best accomplished by varying means, of which this work gives full variety. While we must assent in general to the conclusions reached so carefully and painstakingly, we do not agree with the laudation of the phonendoscope as found on pp. 293 *et seq.*, and " which should be carried as well as the ordinary stethoscope." Nor do we believe that it should " be preferred to radiography." We are of the opinion that the slight importance attained by the phonendoscope after months of exploitation is not likely to be increased.

In closing this brief review we commend the book to the practitioner as complete, in general sound, and containing much that is helpful.

R. W. W.

A MANUAL OF OTOLOGY. By GORHAM BACON, A.M., M.D., Professor of Otology in Cornell University Medical College, N. Y. With an introductory chapter by CLARENCE J. BLAKE, M.D., Professor of Otology in the Harvard Medical School, Boston. In one handsome 12mo. volume of 400 pages, with 109 engravings and one colored plate. New York and Philadelphia: Lea Brothers & Co., 1898.

THIS excellent manual successfully attempts exactly what its size warrants, in giving to students and practitioners a brief but most practical introduction into the management of ear diseases; while specialists who already know the author's competence will be glad to have his succinct judgments upon the many points which are rather new or still unsettled. Radical where he sees his way clear, and sharp-cut in the expression of his views, Dr. Bacon is yet a determined opponent of the fledgeling "advances" which are constantly being launched for brief flight and destructive fall; and only those new ideas and methods of treatment which have rational basis and real applicability find here place except for words of warning or condemnation. Old methods have their deserved indorsement and precise description; but we must dissent from the advice that spraying with 4 per cent. cocaine solution should "in all cases" (if ever) precede catheterization. Some of the anatomical details have not the clearness which could be desired, and Leidy's epoch-marking demonstration, that the antrum is the posterior tympanic cavity, and not a mastoid cell around which has crystallized much of the advanced surgery of the ear, has not its due recognition. Yet the most modern of aural surgery is none the less well presented; for the author is one who has found that he must himself operate not only in mastoid empyemas, but in sinus-thrombosis and brain-abscess cases, and restore nasal patulency by removing adenoids and straightening septums, if he is to have them done as his knowledge of his cases shows to be best. The book well defines the advance ground of the skilful and daring yet really conservative otologist; and while not all of his colleagues and still fewer of his students can expect at once to be able to follow his lead, they will do well to go no farther, but strive to perfect themselves within the field which he has so well marked out.

B. A. R.

Diseases of Women: A Manual of Gynecology. Designed Especially for the Use of Students and General Practitioners. By F. H. Davenport, A.B., M.D., Assistant Professor in Gynecology, Harvard Medical School; Assistant Surgeon to the Free Hospital for Women, Boston. Third edition, revised and enlarged. With 156 illustrations. Pp. 391. Philadelphia and New York: Lea Brothers & Co., 1898.

For nine years Davenport's *Manual of Gynecology* has been of value to those members of the profession who do not perform gynecological operations, but who practise the minor treatment of diseases of women. Its third edition has been enlarged by a brief description of the principal operations of gynecology. In its present form it contains a clear and concise statement of the routine treatment of gynecological cases, including office applications to the endometrium, the fitting of pessaries, and other similar procedures. In treating of operations, notably the closure of the perineum, some excellent simple plates have been added which are of decided practical value.

The author has not, however, made the book a modern text-book, because many of the procedures which he describes are not now practised by those most thoroughly informed upon the subject. Some minor methods of treatment of distinct value are not mentioned in the book. Among them are general massage and Swedish movements for the corrections of displacements, pelvic massage for displacement and adhesions, and the proper regulation of the patient's dress. We do not gather from the book that in making applications to the endometrium the most careful aseptic precautions are absolutely necessary if injury is to be avoided. We do not find mention of sterilization of specula and other such instruments before such applications are made.

Of the smaller books upon the subject this has been extensively used, and has been found of decided value. In its present condition it contains considerably more information than formerly. E. P. D.

RECHERCHES CLINIQUES ET THÉRAPEUTIQUES SUR L'ÉPILEPSIE, L'HYSTÉRIE, ET L'IDIOTIE. Compte-Rendus du Service de Bicêtre pendant L'Année 1897. PAR BOURNEVILLE. Paris: Aux Bureaux du Progrès Médical, 1898.

CLINICAL AND THERAPEUTICAL RESEARCHES ON EPILEPSY, HYSTERIA AND IDIOCY. Annual Report of the Bicêtre Hospital for 1897. By BOURNEVILLE.

THIS eighteenth volume of Bourneville's reports from his service at the Bicêtre maintains the reputation of its predecessors. The whole series, extending now from the year 1880, constitutes an enormous receptacle of data relative to the care and study of the epileptic and feeble-minded. As such it is unrivalled in the literature of medicine. The present volume is arranged much like those that have previously appeared. The first part is devoted to a history of the service during the year, both at Bicêtre and at the "Fondation Vallée." This latter institution, designed as a colony for epileptics and the more chronic cases among girls, has, owing to the needs of the service, not been entirely restricted to its original use. A separate report, covering the history of the work there, is included in this volume. The historical and statistical part of the present volume is replete with detailed information, and is especially valuable for those who are interested and engaged in the administrative work of hospitals and asylums for the insane and feeble-minded. It is quite impossible for us in the space at hand to give an adequate résumé of the report which constitutes Part I. of this volume.

The second part of Bourneville's volume is devoted to the clinical and scientific aspects of his work. This is a feature which is usually lacking in the reports of American asylums. It shows that Bourneville and his assistants are not entirely immersed in administrative details. Too much praise cannot be given for this feature of the report. It proves conclusively that there is little ground for the assertion, at least in France, that the time and opportunity for scientific research cannot be gained or utilized in large hospitals for the insane and idiotic. It is gratifying to note that this excuse is no longer so common in our American asylums as formerly, and that in some of them a high class of scientific work is being done and reported. These successive volumes of Bourneville are a constant incentive to such work wherever they are known. The recent splendid publications under the auspices of the New York State Board of Lunacy are worthy rivals of Bourneville. In fact, we think they are quite superior to his volumes in the extent and thoroughness of the work done. In the present volume there is a series of clinical reports on interesting cases, accompanied, in some instances, with anatomical and histological studies. There are also some handsome plates of diseased and deformed brains. Among these reports the most interesting are those on epilepsy due to onanism, porencephalon, meningo-encephalitis, sclerosis and atrophy of the brain, hydrocephalus, and epilepsy consecutive to typhoid fever. These subjects are treated with more or less thoroughness, although, being founded usually on individual cases only, there is here and there some meagreness in this respect. This enumeration of the contents, however, will show the range and variety of the work, and may be sufficient to serve as an introduction to a volume the predecessors of which, as well as the worth of their distinguished author, are already widely and favorably known. J. H. L.

HISTOLOGY: NORMAL AND MORBID. By EDWARD K. DUNHAM, Ph.B., M.D., Professor of General Pathology, Bacteriology, and Hygiene in the University and Bellevue Hospital Medical College, N. Y. Illustrated with 363 engravings. New York and Philadelphia: Lea Brothers & Co., 1898.

IN this work both normal and pathological histology are considered; this is an unusual procedure. The subjects are necessarily but briefly discussed, and when we survey the immense field which is to be covered it is at once apparent that the book must be quite elementary. However, a large amount of information is crowded into the 439 pages of text.

In the part devoted to normal histology, comprising 239 pages, the author aims to call attention in a general way to the functions of the tissue elements and to emphasize "the close relations between cellular activity and structure."

The work thus assumes a practical character. 130 pages are devoted to pathological histology; only some of the general processes, such as the degenerations and infiltrations and structural changes due to damage, being taken up. There is a good chapter on tumors. About forty pages are devoted to histological technique.

The illustrations throughout the book are clear, though not many of them are original.

The publishers' work has been well done. C. A. H.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

WILLIAM OSLER, M.D.,
PROFESSOR OF MEDICINE IN THE JOHNS HOPKINS UNIVERSITY, BALTIMORE, MARYLAND,

AND

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Bronchial Asthma.—Talma (*Berliner klin. Wochenschrift*, 1898, No. 52) believes that bronchial asthma is caused by a spasm of the muscles of the air-passages that can be voluntarily checked. It is assumed that a whistling ronchus, which is highest at the end of expiration, is one of the characteristic signs of asthma. This sound is transmitted from one place to another, and must originate in the larger air-passages—either the pharynx, larynx, trachea, or perhaps a main bronchus. Assisted by Zwaardemaker, Talma made numerous laryngoscopic examinations, with the following results: In all cases examined the glottis was wide open in the beginning, but at the end of expiration, when the murmur was highest, the vocal cords approximated. Moreover, the walls of the larynx above the glottis were tense and drawn together, the space between the posterior wall of the pharynx and the base of the tongue was lessened, as was also the space between the ary-epiglottic ligaments. It was obvious the whistling was produced by these stenoses. Drawing the tongue forward at once checked the rhonchi. A general narrowing of the trachea could also be seen, evidently produced by spasm of the muscle-fibres in the posterior wall; but Talma shows by measurements that contraction of these muscles in the trachea and main bronchi cannot account for the whistling and dyspnœa. He, therefore, thinks that spasm of the larynx and aditus, rarely spasm of the constrictors of the glottis, plays the chief rôle in asthmatic dyspnœa; spasm of the trachea and bronchi being of subordinate importance. Spasm of the bronchi he admits does occur, and is recognized by the presence of sibilant râles heard in different parts and independent of each other. The effect of volition on the constriction of the bronchi often makes the cause clear. Many persons can at once relax or contract the air-passages; but in many cases the conditions are complicated, a bronchitis being associated with spasm, a spasm exciting bronchitis. The following facts bear on the treatment: 1. Spasms of the air-passages can be produced voluntarily by most asthmatics and by many normal persons. 2. Almost all asthmatics can suppress the spasms even during an attack, but especially during the remissions, so that along with vigorous respiratory interchange the abnormal breath sounds are absent. 3. The muscles of the air-passages are, or can be, placed under the control of the will. The following therapeutic suggestions are offered: Patients with asthma should practice respiratory gymnastics. They should learn to breathe deeply and slowly. It is usually necessary to teach proper expiration first. The inspiration during speech should be slow and deep, the speech should be slow and measured. Assistance from a trained instructor is very useful, but not absolutely necessary, during the whole treatment, which may require months.

Physical Diagnosis of Pleural and Pericardial Effusions.—SCHÜLE (*Münchener med. Wochenschrift*, 1898, No. 51) reports two very interesting cases of pleurisy with effusion, in which the friction rub of dry pleurisy was heard. Case I. had every sign of pleuritic exudate. Suddenly over the entire area of dulness a distinct pleuritic friction rub was heard. An exploratory puncture was made, and several c.cm. of exudate withdrawn. In Case II. the friction rub was diffuse, but especially audible over the lower part of the dulness. Fluid was demonstrated by several exploratory punctures. The author draws the entirely correct conclusion that circumscribed areas of lung and costal pleura were in contact, the exudate not being very great; also, that aspiration should always be practised in such cases.

The author has made experiments upon the cadaver that lead him to modify some of the commonly accepted ideas regarding the physical signs in pericarditis with effusion. Of the early signs of this disease a dulness over the manubrium is considered the most important. This phenomenon is usually explained by the pushing up of the fluid by the heavier heart. The author holds this idea to be incorrect. When water is injected into the pericardium of a cadaver it distributes itself evenly and presses on all sides, and not in the upward direction alone. When 150 c.c. of water are injected, dulness appears under the manubrium. The author's explanation is as follows: The pericardium resembles a long-necked flask, the neck surrounding the great vessels. Here the fluid collects relatively early and displaces the lung borders from the mediastino-costal sinus. At the same time the heart is surrrounded with fluid, and its area of dulness is increased to the right and left; but this is not so striking as the dulness, where formerly was resonance, under the manubrium. Œdema of the mediastinal tissues can produce a similar dulness of the manubrium, and sometimes occurs shortly before death. The artificial injection of the pericardium also furnishes some interesting facts about the shape of the dulness. It required about 250 c.cm. of fluid to produce the usual characteristic triangular-shaped dulness. It was especially distinct with 350 c.cm. When the pericardium was filled to its limit —700 to 800 c.cm.—the form no longer corresponded to that usually described. Instead of an obtuse-angled triangle, with sides extending from the jugulum to the right mammillary and left axillary lines, respectively, the pericardium was distended chiefly to the left and downward, the right edge of the dulness being in the right sternoclavicular line. The author admits that in long-standing inflammatory processes the right wall may become yielding. In acute processes, however, such as hydro-pericardium or hæmato-pericardium, we have a condition similar to that in the cadaver, and we do not then have an equilateral triangle. He thinks that the compressed lung or a pleuritic exudate complicates the percussion findings more often than is thought, thus agreeing with Biernacki (*Volkmann's Sammlung klin. Vortr.*, 1897).

The Causes of the Healing of Tuberculous Peritonitis after Laparotomy.—HILDEBRANDT (*Münchener med. Wochenschrift*, 1898, Nos. 51 and 52) carefully reviews the numerous theories which have been presented as explanations for the results of laparotomy in tuberculous peritonitis, and discards them all as incapable of satisfactorily solving the problem. In order to discover how the healthy and diseased peritoneum reacts to known irritations he made the following experiments: Laparotomies were performed on healthy dogs and rabbits in a room at ordinary temperature. A marked increasing hyperæmia was noticed, the vessels pulsated actively, the serosa, which in the beginning appeared pale blue, took on a rose-red hue, and vessels previously almost invisible became distinct. A venous hyperæmia soon ensued, and the intestines became paralytic and distended. In operations under physiological salt solution at the body temperature there was only an arterial hyperæmia—no venous hyperæmia, distention, or paralysis. A tuberculous peritonitis was produced by injecting slightly virulent tuberculous material into the abdomen of rabbits and dogs. The effect of subsequent laparotomy showed itself in several ways: It checked the spreading of the process; it caused a disappearance of the tubercles; it prolonged life. Like Gatti, the author found that operations after injection, but before the appearance of tubercles, had no effect on the process. Following operation the author observed an involution of the tuberculous process, and in isolated cases a complete healing, with disappearance of the tubercles which he had seen in the laparotomy. In considering the bearing which these facts have upon the explanation of the cause of the recovery the author reminds us that there are tuberculous diseases of the peritoneum that heal spontaneously, and he believes that laparotomy only increases the natural healing factors. The venous hyperæmia which follows the laparotomy is more marked in the tuberculous than in the normal peritoneum. He draws an analogy from the fact that in heart diseases and kyphosis, venous hyperæmia has a curative influence on tuberculous processes in the lungs, as has passive hyperæmia upon similar processes in the joints, bones, and tendons, and concludes that venous hyperæmia, which lasts for days after laparotomy, is the important factor in the healing of tuberculous peritonitis.

Agglutination and Serum Diagnosis in Diphtheria.—J. BRUNS (*Berliner klin. Wochenschrift*, 1898, No. 51) has recently made a series of experiments on forty-four cases of diphtheria, with the object of testing the agglutinating property of the serum of diphtheria patients and the value of agglutination as a diagnostic measure. His results agreed in part with those of Nicolas, who found the agglutinating principle present in antitoxin and in the serum of two men treated with antitoxin, but not in the serum of diphtheria patients who had not received injections of serum. In his series the author tested the serum of seven patients before they had received an injection of antitoxin, with positive results, differing in this respect from the results of Nicolas. In the whole series there were only two negative results. Agglutination was produced by dilutions ranging from 10 to 400. The same method was followed as in the Widal test. Cultures of twelve to sixteen hours were used, as older cultures gave pseudo-agglutination. A longer time is required for the reaction than in Widal's test. This is explained by the non-motility of the diphtheria bacillus. The diminution of the motility of the germs, so characteristic in the typhoid test, is of necessity wanting in this; the germs collect in small clumps, with the interspaces entirely free from bacilli. A direct proportion between the strength of the agglutinating power and the severity or length of the disease could not be proved. The following are the author's conclusions: Agglutination shows itself in the serum of patients sick with diphtheria, as also in antitoxin. Its presence is not constant for all diphtheria cultures and diphtheria serums. A clinical diagnosis by means of serum is impossible. A separation of diphtheria and pseudo-diphtheria bacilli by means of the specific immunity reaction is not possible. The pure, undiluted diphtheria serum possesses *in vitro* a slight power to limit the growth of diphtheria or pseudo-diphtheria bacilli, but no germicidal power.

Thyroid Gland and Myxœdema.—MENKE (*Berliner klin. Wochenschrift*, 1898, No. 51) discusses the supposed relation between myxœdema and the thyroid gland. He believes that we must go further back than the thyroid to find the cause of myxœdema, and thinks that perhaps in disease of the vascular system, with its associated disturbances of nutrition, we shall find the solution. Because of the striking similarity between old age and myxœdema, Vermehren believes that old age is a chronic myxœdema following degeneration of the gland, while myxœdema in the young is a premature senility. In both we find rough and dry skin, disturbed nutrition of the nails, teeth, and hair; slowness in speech, thought, comprehension, and movement; general anæmia; often pyschical disturbances and subnormal temperature, with very little tolerance against cold. The author takes issue with English writers, who believe that myxœdema is entirely dependent upon alterations in the thyroid gland. If this were so the disease ought frequently to be present in old age, since at this time of life atrophy of the gland is the rule; also it should follow suppuration of the thyroid, gangrenous thyroiditis, interalveolar sarcoma and carcinoma, and the more rare diseases of the thyroid, such as syphilis, tuberculosis, and echinococcus. In none of the cases reported were there symptoms of myxœdema. Mordret found in 131 autopsies on insane patients thirty-four cases of atrophy of the gland, and in none of them myxœdema. Naumann collected 408 cases of total extirpation of the thyroid; 309 remained well, twenty-six died of tetany, sixty-eight of myxœdema, four of tetany and myxœdema. Undoubtedly in some of the 309 cases there were accessory thyroids or remnants of the gland, but it is out of the question that this should happen in all of them. The author reasons that if total extirpation is not always followed by myxœdema the thyroid cannot be the cause of myxœdema, or the gland must share its function with some other organ. He believes that disease of the circulatory system is the cause of this condition, and mentions especially the alterations of the capillaries, the arteritis, with atheromatous or amyloid degeneration and perivascular hemorrhages, so often noted.

[The author's recommendation that in future autopsies the condition of the vessels be more carefully examined, is valuable; but his criticism, while ingenious, leaves out of sight one of the most important grounds for looking on the thyroid alteration as the most important, viz., the results of treatment. His conception contains a hiatus that makes it useless as a working hypothesis.—G. D.]

Suprarenal Gland Extract as a Hæmostatic.—LERMITTE (*The British Medical Journal*, February 25, 1899, p. 467) says that the vaso-constrictor and hæmostatic action of the extract of the suprarenal glands has repeatedly been demonstrated in ocular and nasal surgery and in the treatment of skin diseases. A case of persistent epistaxis occurring in his own practice would seem to demonstrate another valuable practical use to which the drug may be applied. The patient was a boy, aged six years, who had suffered from severe epistaxis which had developed during the convalescence from a severe attack of diphtheria in 1894. Since then, and up to September, 1898, when he came under Lermitte's care, he had had on an average from three to four severe hemorrhages weekly. Various forms of constitutional, but no local treatment had been used without beneficial effect. Examination of the nasal mucous membrane showed a dilated and angiomatous condition of the blood-vessels. On September 17, 1898, Lermitte commenced treating the nose locally by inserting into each nostril a pledget of cotton-wool soaked in a 5 per cent. solution of cocaine, leaving them *in situ* for five minutes. On withdrawing these, similar pledgets, soaked in a saturated solution of boric acid containing five grains of dried extract of suprarenal gland to the ounce were inserted and left in for the same time. These applications were made on alternate days until October 7th (three weeks), then on every third day till October 31st (three weeks), and afterward on every fourth day up to November 22d, making in all twenty-four applications.

The immediate effect on the nasal mucous membrane was to produce a condition of ischæmia, and the epistaxis was immediately stopped. Up to the time of writing there had been no return of the epistaxis since the first application was made.

Palpatory Percussion, Etc.—E. BAELZ (*Berliner klin. Wochenschrift*, 1898, No. 48) publishes some practical observations in physical diagnosis. He draws the conclusion from its variety of forms and material that the plessimeter is of more than doubtful value, and in practice is well replaced by the finger. Similar objections have also made him give up the percussion hammer. He calls especial attention to the subject of palpatory percussion. This has not been used as much as it deserves, for two reasons: In the first place, because it has been used chiefly on an organ to which it is least applicable—*i. e.*, the heart; and, secondly, because its technique has not been understood.

He himself came to cultivate this method by noting the greater accuracy of the sense of touch than that of hearing in certain physical examinations. The method is as follows: The left middle finger is placed closely on the body, as in the usual finger percussion. The percussing hand is used in a different way from the usual one. The second, third, and fourth fingers are kept flexed at an angle of about 45°. From a distance of about 2 cm. the fingers are brought down on the left middle finger and kept there for a few seconds, after which the blow may be repeated. It is immaterial whether the percussing hand is moved from the wrist or elbow. The important points are that several fingers are to be used in percussing; that these fingers touch the plessimeter finger with the most sensitive part, or the tips, and that they are pressed against the parts examined. The perpendicular blow from the finger must therefore not be used. While percussing one must listen intently, as the sound produced is not loud. In fact, hearing is not essential, but the combined sensation of hearing and feeling is more complete than that of feeling alone. Like every other method, this requires a certain amount of practice. In the beginning it is useful to close the eyes, in order to notice fine points of difference. Palpatory percussion reveals most in connection with diseases of the lungs, pleura, spleen, and liver, and wherever, for any reason, strong percussion cannot be used, as in perityphlitis and cholelithiasis. It is also safer whenever there is risk of hæmoptysis. In the case of pleurisy with effusion the upper border will usually be found by this method two finger-breadths higher than the line of absolute dulness. An enlarged and inflamed gall-bladder can sometimes be made out by this method, when simple percussion would not be possible on account of the pain. The spleen is especially well demonstrated by palpatory percussion, although this may sometimes give uncertain results on account of distention of the stomach or intestines.

Baelz also advises a wider use of direct auscultation than is commonly practised, especially on account of the possibility of hearing more distant sounds and of distinguishing the relative distances of sounds, such as râles and friction sounds. He also claims that certain heart murmurs, especially the diastolic murmur of aortic insufficiency, can be heard better with the ear than through the stethoscope. In case of aneurismal murmurs, direct auscultation has the great advantage that the head applied to the chest is more sensitive to the thrill and impulse than the hand.

[Many of Baelz's suggestions have long been familiar in the United States —especially his remarks in regard to the value of finger percussion. It is doubtful whether palpatory percussion and direct percussion are used as much as they deserve. They have long been practised in the editor's clinic, but seem to be unfamiliar to many medical acquaintances.—G. D.]

Experimental Inorganic Heart-murmurs.—TALMA (*Berliner klin. Wochenschrift*, 1898, No. 47) reports some interesting experiments made under his direction and published in full (in Dutch) by his pupil Van Dorsten. The experiments were made on dogs, by noting the points where murmurs were heard, putting needles into the body, and then opening the latter. Canulæ were introduced into a femoral artery for withdrawing blood, and into a femoral vein for injecting fluid at body temperature. These experiments showed: 1. That oligæmia is rarely the cause of inorganic murmurs. 2. That hydræmia, especially hydræmic plethora, favors the production of murmurs, especially in the arterial cone of the right ventricle, but also in other parts of the latter, as also in the left ventricle and the arteries. 3. That quinine causes dilatation of the heart, with cardiac and arterial murmurs, like those of chlorosis. 4. That lowering of the frequency of systole—*i. e.*, distention of the ventricles—favors the development of systolic murmurs. 5. That increasing the force of systole increases or produces murmurs.

PEDIATRICS.

UNDER THE CHARGE OF
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Lumbar Puncture in the Child.—PFAUNDLER (*70te Versammlung deutscher Naturforscher u. Aerzte*, Dusseldorf, September, 1898; *Revue Mensuelle des Maladies de l'Enfance*, January, 1899) reports the results of 200 lumbar punctures made in the clinic of Escherich. In tuberculous meningitis he has succeeded in obtaining the bacillus during life in the unusually high proportion of 90 per cent. of his cases. In epidemic cerebro-spinal meningitis the organisms found were the diplococcus of Weichselbaum and the meningococcus of Heubner.

From a therapeutic view-point, lumbar puncture, he believes, gives relief in all cases in which intracerebral pressure menaces life. As a symptomatic treatment it is successful in the cephalalgia, hyperæsthesia, delirium, coma, and convulsions. As a directly causal treatment it succeeds sometimes in hydrocephalus. He also confirms its freedom from danger as an operation, which agrees with the testimony of most observers of the widest experience.

[In this connection, however, it is well not to forget the case reported by ROTCH and WENTWORTH (*Boston Medical and Surgical Journal*, December 12, 1895), in which immediately after the operation the child became restless, the pulse rose to 250 a minute, respiration was superficial, and the skin cool and slightly livid. The child subsequently recovered, and no information was obtained from analysis of the spinal fluid.]

Congenital Stenosis of the Pylorus.—PFAUNDLER (*Wiener klinische Wochenschrift*, 1898, No. 45, S. 1025) states that in the course of his researches upon the capacity of the stomach he has found in fresh cadavers of infants with healthy stomachs that the pylorus was sometimes in a state of persistent contracture, forming a veritable tumor, and being with difficulty permeable by a medium-sized sound. The last segment of the wall would often project several millimetres into the duodenum. By washing with water, or after waiting several hours, this muscular contracture finally disappeared, and then it was seen that the pyloric opening was of normal size.

Microscopical examination in these cases showed a normal structure except a slightly increased size of the muscular fibres—that is to say, an ensemble of lesions usually described as congenital hypertrophy of the pylorus.

The author, therefore, concludes that the stenoses which he has observed and those described under the name of congenital hypertrophy of the pylorus by other writers are simply the result of a reflex contracture of the pylorus occurring in the first weeks of life, and sufficiently explained by an exaggeration of the excitability of the gastric mucosa, which is almost the rule with the nursling.

In this condition, it is almost needless to say, the author is opposed to operative interference, which is contraindicated by both the nature of the affection and the tender age of the infant.

To relieve the spasm he recommends hot and moist applications, narcotics, tub-baths, and especially systematic lavage of the stomach, which, in the normal infant, may even produce temporary incontinence of the pylorus.

A critical review of the subject of congenital stenosis of the pylorus has just appeared from the pen of ROMME (*Revue Mensuelle des Maladies de l'Enfance*, March, 1899, p. 114), who strongly supports the contention of Pfaundler as given above.

The Contagiousness of Gastro-enteritis in Hospitals.—In making a comparison of the statistics of Heubner's service for two successive years, namely, from November, 1895, to November, 1896, and from November, 1896, to November, 1897, H. FINKELSTEIN (*Zeitschrift f. Hygiene und Infectionskrankheiten*, 1898, Band xxviii. S. 124) found a diminution of mortality of 22 per cent. in the second yearly period (from 74.75 per cent. for 1895–1896 to 55.55 per cent. for 1896–1897). During this second term the service for nurslings had been transferred to a new building, where, instead of having one badly ventilated ward, it had two well-constructed wards, and the number of nurses and attendants was doubled. The treatment remained the same.

While recognizing the influence of improved hygiene and the opportunity for greater care in avoiding crowding and securing a certain degree of isolation, the author notes that, at certain periods, infants in way of cure would be suddenly affected with gastro-enteritis, which presented variously the characters of dyspepsia, of acute enteritis, or even of cholera infantum. These gastro-enterites affected a great number of the babies, proving fatal in a certain number, or gradually subsiding after a long and tedious course. These epidemics always coincided with the admission into the hospital of a child affected with this particular form of gastro-enteritis. When once the epidemic was controlled the sanitary state of the wards improved, and the admission of children affected with other forms of gastro-enteritis produced no disturbance among the older patients.

Clinically, this contagious gastro-enteritis was characterized by a sudden onset and by a diarrhœa, with mucus or muco-aqueous stools; in grave cases the stools were sanguinolent or purulent; weight was rapidly lost. The tonic element was manifested by the fever and more or less marked collapse. The autopsy of such cases showed tumefaction of the lymphoid elements of the intestine, with tendency to ulceration. Most especially infectious and contagious were those in which the general symptoms were slight, but the local phenomena (bloody or purulent stools) very marked.

The researches into the causes of this form of infectious enteritis have not yet been completed, but the author is disposed to attribute it to streptococci.

Thyroid Extract in Myxœdematous Idiocy.—SKLAREK (*Revue Mensuelle des Maladies de l'Enfance*, February, 1899, p. 75) exhibited before the Medical Society of Berlin, at a recent meeting, a girl, aged fifteen years, the subject of a congenital myxœdematous idiocy. At the time of admission to the asylum her height was only thirty-two inches and her weight 15 kilogrammes (thirty-three pounds). Under the influence of thyroid treatment for one year the stature increased five and one-half inches, the hair became thick and natural in appearance, the old teeth were shed and replaced by the permanent teeth, the temperature became normal, and the intelligence improved.

Lesions of the Intestine in Heredo-Syphilitics—LOCHTE (*Société Médicale de Hambourg*, October 25, 1898) describes very interesting intestinal lesions found in the bodies of two new-born infants, each dying on the sixth day, the subjects of hereditary syphilis.

In one child there were two gummata in the lung, and one in the head of the pancreas. In the jejunum there was a circular ulceration 3 to 4 mm. in diameter, covered by a dysenteric slough. Similar ulcerations were found in the ileum; Peyer's plaques were normal.

Histological examination showed small round-celled infiltration of the mucosa about these ulcerations, disappearances of Lieberkühn's glands, and thickening of the muscular coat. At the point of ulceration the mucosa was completely destroyed, the submucosa showing cellular infiltration with formation of granulation tissue, with endarteritis and periarteritis. The thickened muscular coat was the seat of confluent hemorrhages.

In the second case the intestine presented even to the naked eye a multitude of yellowish foci of fatty degeneration involving the muscular fibres. Besides these foci there was a considerable number of miliary granulations formed by polynuclear cells and connective-tissue elements, which the author considered to be miliary gummata.

The Symptomatology of Friedreich's Ataxia Following Infectious Diseases.—KATZ (*Deutsche medicinische Wochenschrift*, 1898, No. 37, S. 587) reports the case of a girl, aged eight years, who, in the course of a grave attack of scarlatina, presented symptoms of cerebro-spinal meningitis, and, during convalescence, paralysis of the four extremities, with loss of speech. All these symptoms gradually ameliorated, and when the child was first seen by the author, two years later, she showed most of the symptoms of Friedreich's disease: ataxia and characteristic gait, disturbance of speech, nystagmus, absence of knee-jerks, absence of disturbances of sensation, absence of pain and of paræsthesiæ, and integrity of the sphincters. What was wanting to complete the picture of Friedreich's disease was:

1. Hereditary nervous antecedents; 2. Family type of the disease; 3. Progressive aggravation of the affection, which had shown not the slightest modification of the symptoms in the two years the case had been under observation.

On the other hand, tabes, multiple sclerosis and chorea could be easily excluded, so that the diagnosis of Friedreich's disease seems well established.

Another case, likewise without hereditary antecedents and showing its earliest symptoms two months after an attack of whooping-cough, is reported by VARIOT (*Journal de Chirurgie et de Thérapeutique Infantiles*, 1898, No. 24, p. 463). The patient was a boy, aged eight and one-half years. The symptoms consisted of ataxia of the lower limbs, with abolition of knee-jerks and absence of lightning pains, and the existence of less marked disturbance in the arms; the speech was drawling and articulation imperfect; the Argyll-Robertson sign absent.

Compression of Trachea by Enlarged Thymus.—LANGE (*Société Médicale de Leipzig*, December 13, 1898; *Revue Mensuelle des Maladies de l'Enfance*, March, 1899) reported a case under this title, observed in a nursling of four months, who, for fifteen days preceding death, had continual attacks of laryngo-spasm, which could not be controlled either by bromides or by phosphorus. These attacks, which lasted three to four minutes, were characterized by slowing of the respiration, cyanosis, clonic contractures of the limbs, with the thumbs flexed and turned inward beneath the other fingers. The child died during one of these paroxysms, and the autopsy revealed a large thymus, which measured 8 cm. in length, 5½ cm. in breadth, and 5 cm. in thickness, and was adherent to the pericardium. The heart, and especially the left ventricle, were hypertrophied. The trachea was distinctly flattened from compression by the enlarged thymus.

The Etiology of Acute Anterior Poliomyelitis.—F. SCHULTZE (*Münchener medicinische Wochenschrift*, 1898, No. 38, S. 1197) publishes a most instructive case, which apparently sheds light upon the etiology of at least some cases of acute anterior poliomyelitis. The patient was a boy, aged five years, who became suddenly prostrated and feverish, and twenty-four hours later presented a paralysis of the two arms. Two days later he was brought to the hospital, and the fever, which was then declining, disappeared on the following day. The paralysis of the arms persisted, and it was then noticed that the muscles of the neck were paralyzed. The plantar reflex was exaggerated on both sides, the abdominal reflex normal. Pressure over the spinous processes was painful, especially in the cervical region.

Several days later the condition remained the same, but slight contracture was manifest in the lower limbs. Lumbar puncture was made, and under considerable pressure yielded 30 c.c. of clear cerebro-spinal fluid containing a few flakes and showing the presence of the meningococcus intracellularis.

The symptoms of spinal irritation gradually disappeared, and several months later the child left the hospital with an atrophic paralysis of both arms. He was seen several times in the following year and no change in the palsy noted.

The case was therefore one of infantile palsy complicated by meningitis, the latter condition being manifested by the contracture of the lower limbs, by the tenderness over the cervical vertebræ, and by the increased pressure of the cerebro-spinal fluid. This meningitis was not diffuse, since such principal symptoms as cephalagia, contracture of the nuchal muscles, and general hyperalgia were wanting. It was evidently localized to the cervical segment of the cord.

The author asks whether the meningococcus found in the spinal fluid was not at the same time the excitant of the poliomyelitis. He believes this a reasonable theory, since it goes far to explain the analogies which exist between epidemic cerebro-spinal meningitis and poliomyelitis, such as the rapid evolution of their clinical symptoms, their frequency in childhood, and the epidemic character of these two affections.

The Anæmias of Infancy.—MARFAN (*Archives de Médecine des Enfants*, 1898, No. 12, p. 712) states that from a clinical point of view the anæmias of young children do not in general produce, as in the adult, cardiac or vascular bruits; inorganic murmurs are absolutely exceptional before the age of three years. In one case, however, which he reports, such murmurs were heard with great intensity in a child of twenty-six months. The anæmia of nurslings is distinguished by two features:

1. It is accompanied very frequently by hypertrophy of the hæmatopoietic organs—spleen, liver, and lymphatic ganglia. These alterations depend probably upon the infectious state which causes the anæmia rather than upon the anæmia itself.

2. It is accompanied most often by a modification of the blood, which is rare in the adult—that is, the habitual appearance in the blood of nucleated red cells, which are encountered in the adult only in the course of grave anæmias with fatal termination. The younger the child the more frequent is the appearance of these nucleated forms.

Etiologically the author emphasizes the statement that the anæmias of nurslings are never primary. Together with the hypertrophy of the blood-making organs, they are one of the symptoms of the cachectic state which is ordinarily produced by subacute or chronic infections. These may be observed in the course of or following gastro-enteritis, and especially with rhachitis, subacute broncho-pneumonia, prolonged pyodermites, adenoid vegetations upon suppurating surfaces, tuberculosis, and syphilis.

As to anæmia infantum pseudo-leukæmica, which is generally considered an autonomous, independent, primary disease, the author, basing his opinion upon two cases very exhaustively studied, believes that he is justified in concluding this condition can succeed a chronic gastro-enteritis complicated by rhachitis.

[This opinion seems to be largely in accord with that expressed by Morse in a recent paper, an abstract of which was published in this department in the preceding number of the JOURNAL, April, 1899, p. 464.—ED.]

SURGERY.

UNDER THE CHARGE OF

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The Treatment of General Peritonitis and the Other Complications of Appendicitis.—BROCA (*Gaz. des Hôpiteaux*, January 17, 1899) expressed his opinion on this subject before the Société de Chirurgie in Paris, as follows:

The diagnosis of general peritonitis is an indication for operation, which should be as speedy as possible. Although the patient operated upon under these circumstances generally dies, Broca has had recovery follow in four of thirty-one cases of this character which he has operated on.

The plan adopted by some surgeons of immediate operation in all cases, he says, was the course he pursued in his earlier operating, but his experience taught him that if the patient was not threatened by the severity of the immediate symptoms, and if peritonitis was not imminent, or a localized collection of pus could not be recognized, medical treatment was the best, while the patient was carefully watched so that as soon as local or general symptoms indicated it operative interference could be immediately instituted.

This course of treatment, however, presupposes the careful watchfulness of a skilful observer, capable of noting any change in the symptoms; for operation must not be delayed after it is indicated by the symptoms, or the patient's chances of recovery are greatly lessened. The result of this medical treatment and waiting is a lowering of the temperature and a decrease in the amount of inflammatory thickening.

The symptoms of appendicitis are now so well known that, although the formation of abscesses in unusual localities is difficult to detect, their presence should be easily recognized. In reference to the removal of the appendix from the abscess at any cost, the author believes this is poor surgery. The adhesions are the patient's safeguard; to break them down places the patient in greater danger. The opening and evacuation of the abscess saves the patient's life, but these adhesions save it till the abscess is opened. Nature does not take care of the appendix in all cases, and he does not believe it should be left to her; it should be removed at a subsequent operation which will have the added advantage of forming a firmer scar in the abdominal wall than that produced by the healing where suppuration was present. These operations are necessary and benign, but he does not advise them in all cases, nor does he believe that operation is indicated whenever there has been an attack of appendicitis. If no tenderness or swelling is present he would wait for further indications before operating.

Plastic Closure of Osseous Defects After Operation on the Mastoid Process.—V. MOSETIG-MOORHOF (*Cent. f. Chir.*, 1898, No. 46) describes the following method of closing the defects that follow operation on the mastoid: A flap is cut, having its broad pedicle on the lower margin of the defect and extending down into the area of skin that is free from hair follicles. If any hairs are present in the area they should be removed by epilation before the operation. The margin of the defect is freshened, except where the pedicle of the flap is attached by a double incision removing a long narrow strip. The edge is then raised by passing the knife beneath it parallel with the surface of the skin. The flap is now turned once and its margin slipped beneath the edge that has been raised. This is facilitated by blunt hooks, which lift the pedicle and facilitate the invasion. The flap is held in place by sutures, while the wound resulting from its removal is closed by interrupted sutures. The raw surface of the flap may be covered by the transplantation of skin or by scar-tissue processes.

The six cases which this author has operated upon have all given satisfactory results. The closure of the wound is immediately secured, and no air can pass through.

A New Radical Operation for Inguinal Hernia without Buried Sutures.—JONNESCU (*Cent. f. Chir.*, 1899, No. 3) describes a method which he has devised for obviating the employment of buried sutures in radical operations for hernia in the inguinal canal.

The operation described differs from others where sutures have been employed only in the method of placing the sutures and the disposition of the stump of the sac, which is brought into the wound and forms a part of the scar that unites the muscular plane that overlies the canal.

The sutures are double silver sutures put in layers. They are U-shaped, the two ends being brought out through the skin on the lower side of the wound and fastened over rolls of sterile gauze. The doubled portion being on the opposite side of the wound in the lower layer in the internal oblique muscle, and in the upper in the aponeurosis of the external oblique, or on the skin where they are looped over other rolls of sterile gauze. In one instance superficial skin sutures are employed, in the other they are not essential. The stitches are removed on the fourteenth or fifteenth day.

The author has been successful in the seventeen cases in which he has employed this method, and believes that the doing away with buried sutures is a distinct advance in the technique of radical operations.

Radical Operations for Herniæ.—BRENNER (*Cent. f. Chir.*, 1898, No. 41) in speaking of Bassini's operation, which he considers almost perfect as an operative procedure for radical cure of hernia, suggests a slight modification which he has found useful and to which he ascribes the very good results obtained.

The operation is performed according to the method laid down by Bassini, except that care is taken in opening up the canal to separate the cremaster muscular fibres from those of the internal oblique, and both from the aponeurosis of the external oblique.

After a careful separation and ligation of the sac the cord is displaced in the usual manner and the muscular fibres united beneath it with interrupted sutures. The union resulting from this slight modification between muscular and muscular tissues is much firmer than where the internal oblique and cremaster are united to the fibres of Poupart's ligament.

The divided fibres of the aponeurosis of the external oblique are then united over the cord and finally the skin. The author adheres to the practice of leaving a drainage-tube in for twenty-four hours. He finds that the oozing that occurs after the operation is carried off by this means and that the resultant healing is better.

He has operated upon 348 herniæ in 251 individuals. The length of time required for healing varied from ten to thirty days. The majority of the patients were dismissed without a truss fourteen days after operation.

He was able to examine after one year and more, 169 herniæ. Ten cases showed relapse—that is, 5.9 per cent.

In young adults where there is hernia present and a predisposition to hernia, the opposite inguinal region should be opened and examined for incipient hernia. The operation completed as a Bassini strengthens the region and prevents hernia. The author has never seen any harm from the operation. In 157 cases he found hernial sacs present on the opposite side in 81 cases. In 27 cases they were very small. In 66 cases there was no sac, but he found in three lipoma of the cord, in one the testicle, in one the obliterated sac, in one funicular hydrocele, and incipient direct hernia in seven cases.

In thirteen women operated upon he found the hernial sac present on both sides nine times.

The Radical Cure of Reducible Hernia by Kocher's Method of Invagination with Lateral Displacement of the Neck of the Sac.—THOMAS (*Bristol Medico-Chirurgical Journal*, December, 1898) describes as follows Kocher's latest modification of his hernia operation, which Thomas has employed with success, since witnessing Kocher's operation, in five cases.

The modification consists in grasping the hernial sac with a pair of long curved forceps; the sac is invaginated into the general peritoneal cavity and carried along the anterior abdominal wall until it is nearly opposite the anterior superior iliac spine on the side operated upon. The point of the forceps is now pushed against the abdominal wall, and a small incision is made through the abdominal muscles down upon it, then the forceps carrying the hernial sac is pushed outward, the sac is caught and pulled out through the wound after liberating the forceps. The sac is then fastened, cut off, the wound closed, and the operation completed in the usual manner. The advantage of the modification is that there is no puckering ligature or depression left at the internal ring to invite a further hernia. . In one of the author's cases the patient, sixteen days after an operation for double hernia, walked a quarter of a mile with no external support.

The author does not believe in personal modifications of methods when a method that gives perfect results is known, nor does he believe in keeping patients in bed after healing has taken place. These scars never give way if linear until months after operation, and not then if the operation was aseptic.

On Re-establishing Surgically the Interrupted Portal Circulation in Cirrhosis of the Liver.—WEIR (*Medical Record*, February 4, 1899) reviews the experimental and clinical work which has been done in this direction, and details a case of his own in which the attempt was made to unite the peritoneal covering of the liver to the diaphragmatic peritoneum and that of the anterior parietes.

The peritoneal surfaces were scratched with the sharp point of a hat-pin, and after the oozing had ceased the omentum was stitched to the edges of the abdominal wound and the wound closed. Siphon drainage was secured by passing a double perforated tube into the pouch between the bladder and attaching a Cathcart apparatus. Compression of the abdomen was produced by overlapping straps of adhesive plaster.

The patient did well for a time, but died from a peritonitis which apparently entered through the drainage-tube, although every precaution had been taken to keep it aseptic. The peritonitis was apparently localized about the tube, and was most intense in that region. The autopsy showed that firm adhesions had taken place where the peritoneum had been irritated. Scolices of echinococci were found encysted on the liver; their presence so deep in the peritoneum may have predisposed to peritonitis. Many micrococci in chains were also found in the adhesions.

Of the seven cases that have been operated upon, two recovered; two recovered from the operative interference, but were not benefited by the operation, and three died. Of these latter, one died from shock, and two from infection through the drainage wound.

The author would hereafter prefer to resort to paracentesis if it became necessary, rather than employ permanent drainage, as the risk seems less. Furthermore, of necessity, in the early stages of any surgical measure such as this, one must and should operate only on those patients who are regarded as hopeless of cure by other measures. Finally, the intent of the operation is to afford relief to the obstructed portal circulation by an artificial anastomosis that will aid nature's efforts in the way of collateral venous circulation.

Traumatic Epiphyseal Separation of the Head of the Femur, with its Relation to Coxa Vara.—SPRENGEL (*Arch. f. klin. Chir.*, Band lxvii. Heft 4) reports two cases of epiphyseal separation of the head of the femur that closely simulated coxa vara. In both cases the epiphysis was displaced downward and had united in a false position that restricted function and produced symptoms so analogous to coxa vara that the true condition was not diagnosed until after the operation. This consisted in a resection of the head of the femur, leaving the great trochanter and part of the neck. The motion in the limb was increased, but neither patient could stand on the affected limb, and they were compelled to use crutches.

The author enters into a long discussion of the literature and finds that recent investigation has shown that the traumatic separation of the epiphysis is much more frequent in the head of the femur than was formerly supposed. Twenty-three cases have been reported, including the two noted in his paper. They should lead in all cases of traumatic injury in youths to the investigation of the condition found present in the epiphysis, and this condition should never be lost sight of.

This author believes that resection and removal of the head of the bone is preferable to any other method of treatment, as by osteotomy either of the neck of the femur or through the trochanter.

Surgical Intervention in Traumatisms of the Heart and Pericardium.—CESTAU (*Gaz. Heb. de Méd. et de Chir.*, 1898, No. 17) makes a careful and critical review of the clinical and experimental work that has been done in connection with this subject. He finds that the pericardium and heart are not regions where surgical intervention is always contraindicated. Surgical intervention with relief from conditions that threatened life has been followed in a number of instances by recovery. Foreign bodies that have entered the pericardium and wounded the heart itself have been removed, the pericardium has been emptied of clots, while suppurative pericarditis has been cured by pericardotomy and drainage.

Before intervention is attempted the condition of shock that is generally present must be overcome. This is accomplished by the intravenous injection of physiological serum and other fluids. The old method of venesection has been abandoned, and it has been found that there is no greater danger by the new method of producing fresh hemorrhage. Intervention should not take place while the heart is weak, and nothing should be done to enfeeble it. Anæsthetics should be avoided or used only in a very slight amount, without full anæsthesia.

The method of intervention is influenced by the form of injury that requires it. If the injury is of the nature of a puncture or prick as by a needle, the foreign body should be removed. If the volume of the foreign body is greater it is better to operate where everything is in sight rather than to trust to the closure of the wound by a contraction as the body is gradually withdrawn. The pericardium and, if necessary, the heart is laid bare, sutures are placed in position, the foreign body removed, and the wound closed immediately by drawing the sutures.

Where an incised wound of the heart is suspected the symptoms must be the guide. Secondary intervention has succeeded in a number of cases, and intervention must be postponed till the symptoms indicate the necessity. The complications to be watched for are hemorrhage and pericarditis. In suppurative pericarditis the universal opinion is that it should be treated as all other forms of abscess in serous cavities.

In hemorrhage the question is still *sub judice.* Immediate intervention is never indicated as spontaneous arrest often cures. Therefore, if the area of pericardial dulness remains stationary and does not increase, expectant treatment is indicated. When, however, there is an aggravation of the general condition, with pallor, weak pulse, syncope, an augmentation of precordial dulness, weakening of the sounds of the heart, and recurrent external hemorrhage, intervention is indicated. When possible the track of the wound should be examined before opening the pericardium.

Further Observations on Coxa Vara.—WHITMAN (*New York Medical Journal*, January 21, 1899) reports an additional series of twenty-two cases of this disease. He believes that it is much more common than is supposed and that many cases are treated as cases of tubercular disease. Coxa vara is a depression of the neck of the femur, in most instances following the line of least resistance, downward and backward, or even downward and forward, and occasionally directly downward. It is one of the group of deformities of the lower extremity due to inherent or acquired weakness of structure or to disproportionate strain, or both, in which knock-knee, bow-leg, and weak foot may be included.

Coxa vara is to be detected only by physical examination. The points developed are: the trochanter is elevated, prominent, and displaced, as may be demonstrated by Nélaton's line and Byrant's triangle, the actual shortening of the leg and the peculiar and unequal limitation of the range of motion dependent upon the deformity. In progressive cases forced passive motion causes discomfort, and at times it may be resisted by voluntary and involuntary contraction of the muscles. This is, however, unusual. There is commonly a certain amount of muscular atrophy, more marked in the thigh than in the leg, which corresponds to the duration and to the degree of the disability.

The condition is probably the result of an inherited or acquired weakness, either of position or structure; it may be the important predisposing cause of the deformity. The exciting cause would be the instability of rapid growth, overstrain, overweight, and injury. Improper surroundings, insufficient nourishment, or debility from any cause, undoubtedly lessen the resistance of the bones as of other parts, but the presence of actual local disease is by no means necessary to explain the deformity.

The preventive treatment, if a diagnosis has been made in the early stages, may succeed, by the use of the perineal crutch and removing the strain of over-exertion, in checking its progress. This should be accompanied by massage, passive motion, and a limited amount of exercise, with passive forcible manipulation of the leg in the direction of limited motion.

The operative treatment consists in correcting the deformity by removing a cuneiform section from the base of the trochanter. The author has had success in the three cases treated in this manner. This operation is seemingly indicated in cases occurring in early childhood. Linear osteotomy below the great trochanter is sometimes valuable in enabling one to correct marked deformity.

In addition to thirty cases of coxa vara the author has seen fourteen cases of fracture of the neck of the femur in children. The majority of these cases were diagnosed as hip disease when sent for treatment. Before these cases can be properly classified an anatomical basis must be found by eliminating non-tubercular affections.

Bloodlessness as a Local Anæsthetic.—KOFFMANN (*Cent. für. Chir.*, 1898, No. 40) calls attention to the fact that bloodlessness as produced by the elastic tourniquet makes the area below the band anæsthetic if a sufficient time is allowed to elapse before the operation is undertaken and if the area immediately below the bandage is not invaded. The bandage must in all cases be very tightly applied.

BRAUN (*Ibid.*, 1898, No. 43), in commenting upon this article, shows that it is only a revival of an old method which has long ago been rightly discarded. The anæsthesia is not produced by the mechanical obstruction of the circulation and the bloodlessness of the region, but by the compression which the tightness of the band produces upon the main nerve-trunk. This is shown by the facts that it is produced by only the tightening of the band altogether, more than is required to effect the circulation, and also that the region immediately below the band is not anæsthetized, although the blood-supply is cut off.

This method is not only very painful in its after-effects upon the patient, but the compression is liable to result in an injury to the nerve-trunk that is permanent, and may be followed by a necrosis at the point of pressure or a permanent injury to the nerve.

Infiltration Anæsthesia.—HEINZE (*Arch. für path. Anat. und Phys.*, 1898, Band cliii. Heft 3) has conducted a series of experiments that are of great value in determining the local anæsthetic power of various agents that are now in vogue for this form of anæsthesia.

The tests were not made upon animals or upon various individuals seen in the course of clinical work, but upon his own person.

The action of varying anæsthetic solutions he found to be due entirely to the amount of cocaine they contained, and not to peculiar properties that have from time to time been attributed to the combined action of their other constituents.

His experiments further demonstrated that the action of eucaine-B and cocaine were equal. One reason of this is that, as shown by Braun's researches, their osmotic tensions are about the same. The anæsthesia which they produce in 0.1 per cent. and still weaker solutions lasts about fifteen minutes. The irritant action of eucaine-B is less even than that of cocaine; 5 and 6 per cent. solutions were not as painful when injected as cocaine solutions of the same strengths.

The eucaine-B solution was found to be less toxic than cocaine, and has the advantage of being capable of sterilization. He recommends its employment in place of cocaine, and that it should be generally employed in infiltration anæsthesia in weak solution, as in the following formula:

Eucaine-B	gr. iss;
Sodium chloride	gr. xij;
Distilled water	f℥iij; ʒij.

Such a solution is capable of being sterilized at any time without interfering with its efficiency. It causes no swelling, and therefore does not injure the tissues or interfere with primary union. The eucaine-B is the only anæsthetic in the solution, the salt simply preventing irritation.

BRAUN (*Archiv für klin. Chir.*, September, 1898) deals in a critical manner with the different methods that have been employed for local anæsthesia—the mechanical form, that partly mechanical and partly due to drugs, and, lastly, that due entirely to the action of certain drugs on the terminal filaments of the nerves. This author agrees with Heinze that eucaine-B and cocaine are the only drugs that really produce local anæsthesia without harmful after-effects; they paralyze without irritation or injury to the tissues, and produce an anæsthesia, in dilute solutions, that is sufficiently lasting for operative purposes. He recommends its employment in the same solution as given above, and for the same reasons prefers it to cocaine.

His researches and those of others have shown that while eucaine-B, when employed in 5 or 10 per cent. solutions, cannot fail occasionally to produce symptoms of poisoning, it is an ideal and perfectly harmless drug when properly employed for infiltration anæsthesia. When employed in the solution described above and sterilized it has never interfered with the normal course of healing in the wounds in which it was employed.

He notes the fact that this local anæsthetic, like cocaine, cannot be employed where heat, as the actual cautery, is to be employed, as the heat destroys the anæsthetic properties of the drug. The osmotically indifferent warmed solution of eucaine-B is very serviceable in opening acute or chronic abscesses, and does not give rise to the pain so often noted with Schleich's solutions. He found the 1 per cent. eucaine-B solution far preferable to local infiltration anæsthesia where it is desired to effect the conductivity of the nerve-trunk and produce regional anæsthesia, as in the fingers and toes. The action in these cases he considers all that could be desired. Six per cent. of salt should be added to all solutions.

Undoubtedly there are cases in which the stronger solutions are preferable to infiltration of the tissues by the more diluted ones, but in general weak solutions should be employed where equally good results can be attained.

THERAPEUTICS.

UNDER THE CHARGE OF

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The Use and Abuse of Atropine in Ocular Therapeutics.—DR. A. D. MCCONACHIE regards its greatest indication to be in iritis, whether rheumatic, traumatic, syphilitic, or idiopathic. In adults one drop of a 1 per cent. solution usually suffices to dilate the pupil fully if instilled every two or three hours. In children of one to five years, one-fourth of 1 per cent. solution should be used. Intolerance of the drug is shown by: (1) Toxic symptoms, as dry throat, nausea; (2) the production of catarrh—this usually follows long-continued use; (3) redness and swelling of the lids. It is indicated in all traumatisms of the eye when iritic or cyclitic involvement is suspected, in corneal inflammations, ulcer of the cornea, and to dilate the pupil for ophthalmoscopic examination. Among the abuses cited are its uselessness or even positively injurious effects in simple uncomplicated conjunctivitis, not only because it possibly may increase the conjunctival inflammation, but because of the unnecessary inconvenience of disturbed vision. It should never be used simply to dilate the pupil temporarily in patients beyond forty-five years of age, the glaucomatous tendency being more marked at this time, and its instillation can readily so occlude Fontana's spaces as to precipitate an attack of acute glaucoma. Under no circumstances should it be used in glaucoma.—*Maryland Medical Journal*, 1899, No. 13, p. 195.

Cure of Diabetic Coma by Large Injections of Artificial Serum.—DRS. ROGET and BALWAY mention several solutions in use for intravenous or subcutaneous injection varying slightly in composition. They prefer: Sodium chloride, 7; distilled water, 1000, and think that the composition of the liquid is of less importance than generally supposed. The object to be attained is the elimination of the poisons, and this requires healthy kidneys.

The remaining organs of elimination, the kidneys being diseased, will not suffice. The injection of salt solution with or without the addition of alkaline salts, probably acts in several ways, and thus is explained improvement in diabetic coma, with complicating renal disease. It furnishes fluid to the dehydrated tissues. Owing to the great polyuria, constant exoserosis of fluid results in a dessication of the tissues; the blood becomes thick. Saline injections prevent these changes, and rendering the blood less viscous will remove the poisonous elements. Glandular activity is increased by the additional supply of fluid. The salivary and sudoriferous glands increase markedly their excretion. The intestinal mucous membrane permits transudation of so much fluid that, clinically, a diarrhœa results. Thus, much of the poisonous material can be eliminated. The harmful action of the remaining toxic matter is retarded by the saline injection. The nervous system is also affected. Constantly bathed in a poisoned fluid the nerve centres are as though anæsthetized. To this is due the clinical picture of diabetic coma. Following the injections the patient recovers consciousness. Experiments are quoted to show that sodium chloride actively affects muscular respiration. Following intravenous saline injection the absorption of oxygen and elimination of carbon dioxide is more active in the muscles. Perhaps the saline solution also exerts a beneficial influence, causing hyperleucocytosis, and affecting the blood-making organs; it may be serviceable in other unknown ways. Nevertheless, the poisoning can only be retarded, for the toxic element increases with great rapidity, and, there being an insufficient renal elimination, soon poisons the patient. Study of a series of cases shows that in two patients who were permanently cured of coma clinically, the kidneys were healthy, and in one of these dying four months later the post-mortem microscopical examination showed the renal tissues to be sound. In six patients who were temporarily benefited, recovering consciousness for a time, all showed grave kidney lesions at autopsy. Following the saline injection it has been proved that the acidity of the urine is increased at least one-third, and thus the toxic matter is eliminated. The cure of diabetic coma can be hoped for only in patients with healthy kidneys. Where renal disease is present, temporary amelioration is very likely to follow the saline injections. One or two quarts are to be introduced daily. Too little fluid does not sufficiently dilute the circulating poisons; too much causes effusion into the serous cavities and dilatation of the heart. Early operation is very essential to success. The longer the coma has existed, the more profound is the poisoning. Subcutaneous injection will suffice when the coma threatens to appear. If coma be present intravenous injection is indicated.—*Lyon Médicale*, 1899, Tome xc. p. 158.

The Treatment of Gout.—DR. A. DE THIERRY MOUILLOT argues from the success of colchicum that the objects aimed at should be to diminish the quantity of uric acid formed and stimulate the intestinal glands and liver, while endeavoring to remove all the uric acid formed through the excretory organs. Colchicum probably acts by its effect on the liver and intestinal glands, which increases the quantity of bile, thus removing, in the form of glycocholic acid, one of the antecedents of uric acid. Chronic gout and goutiness must be treated mainly by diet and periodic visits to watering-places. The main points in diet are to drink liquids freely apart from meals, and to make the meals as little complex as possible. Stimulants should never be taken except at meals, on account of their effect on the liver. The waters of Harrogate reduce the amount of uric acid eliminated while increasing that of urea. The reason evidently is that the sulphur-saline waters remove by the bowels some of the antecedents of uric acid, while their stimulating effect on tissue change increases the principal product of metabolic activity—urea.—*The Medical Press and Circular*, 1899, No. 3125, p. 321.

A New Base for the Application of Drugs to the Skin.—DOTT. PIETRO BALLICO writes concerning filmogen, which is a solution of cellulose nitrate in acetone, to which is added castor oil to give it elasticity. On evaporation of the acetone an adherent, impermeable, and transparent film is formed. This completely excludes atmospheric air, prevents the development of secondary pathological products, limits the secretions and controls the strength of the remedy. Its suggested uses are: 1. As an antiparasitic, with chrysarobin, pyrogallic acid, resorcin, ichthyol, and salicylic acid. 2. To close small wounds either alone or with iodoform. 3. To limit ulcerative infectious processes either alone or with corrosive sublimate or iodoform. 4. In secondary syphilis, palmar or plantar psoriasis, and papular or gummous forms, with corrosive sublimate. 5. For warts and condylomata as a 5 per cent. solution of corrosive sublimate. 6. To absorb or soften infiltrations and collosities, with soda, potassium iodide, resorcin, or salicylic acid. 7. To relieve prurigo, with resorcin, ichthyol, and menthol. 8. As an antiphlogistic in acne, eczema, and intertrigo, either pure or with ichthyol or salicylic acid. Ordinarily 10 per cent. (corrosive sublimate 5 per cent. only) solutions are employed.—*Gazzetta degli Ospedali e delle Cliniche*, 1889, No. 1, p. 15.

Local Cocaine Anæsthesia Combined with the General Action of Morphine.—DR. CECI writes that more accidents from general anæsthesia occur than are reported, and post-operative complications due to the anæsthetic are frequently overlooked, such as renal and hepatic inflammations following etherization. He believes that many sudden deaths occurring several days after operation, and inexplicable anatomically, even at necropsy, are due to chloroform. In young patients all minor operations should be done without any anæsthetic. The local action of cocaine is always to be preferred to general anæsthesia, except in most grave cases. Care must be taken that the solution is aseptic. Extirpation of goitre, rectal resection, vaginal hysterectomy, cœliotomy, have been successfully performed with cocaine anæsthesia. Strength of solution: Cocaine hydrochlorate, 1; boric acid (saturated aqueous solution), 200. Should be freshly prepared; boiling is necessary. To prolong and deepen the local anæsthesia, morphine is injected some minutes before the cocaine, the maximum and minimum doses of morphine being respectively two-fifths and one-tenth of a grain. The smaller amounts are indicated in vigorous young adults, the larger in advanced age. To patients eighteen or twenty years of age morphine is seldom given, and even cocaine itself is infrequently exhibited. The author prefers a single deep injection of cocaine to a number of subcutaneous ones. This latter method—"anæsthesia by infiltration"—is serviceable when the operative field is much extended, as in intra-abdominal cases. The addition of morphine to the local cocaine injection prolongs anæsthesia at least half an hour, and often forty or fifty minutes. Using the above indicated small quantities of cocaine, intoxication has not been observed. Slight dryness of the throat and thirst occasionally occur, rarely excitation and loquacity. Wölfler's "dangerous zone" is not sufficiently demonstrated to be useful. Attention is called to the rapidity with which anæsthesia can be obtained, this being equally true in alcoholic patients. The author does not explain his objection to the use of cocaine in young adults.—*La Semaine Médicale*, 1899, No. 6, p. 41.

OBSTETRICS.

UNDER THE CHARGE OF

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Intestinal Occlusion Complicating Pregnancy and Labor.—MEYER (*Monatschrift für Geburtshülfe und Gynäkologie*, 1899, Band ix., Heft 2) reports two interesting cases of occlusion of the intestine in pregnant and parturient women.

His first case was a multipara, who, during her pregnancy, sustained a severe blow upon the abdomen. This was followed by a movement of the bowels, by pain and vomiting, and by the beginning of what she supposed to be a premature labor. The pain was subdued by morphine, and, as the patient could not be delivered, she was kept under observation without active interference. Two days later she was much the same, with occasional abdominal pain, the tongue moist, and the pulse 100. The abdomen was tender, and efforts to move the bowels failed. She grew worse, and was removed to a hospital for operation.

Although hernia could not be diagnosticated, it seemed most likely that strangulated hernia was the condition present. Accordingly it was determined to cut down upon the usual site of hernia in the side where most pain was located, and, should nothing be found there, to open the abdomen.

When this was done hernia was absent, but in the left broad ligament was found a small opening through which the bowel had slipped. The intestine was readily extracted, and was not in a very bad condition. The operator endeavored to stitch together the aperture, but owing to the large size of the pregnant womb this was difficult. He accordingly very gently tore the opening so widely that the accident could not recur.

Shortly after the operation the patient came into labor, and was delivered of a living child. Both made a good recovery.

The second case was a primigravida, who suffered from vomiting, failure to move the bowels, and the usual phenomena of intestinal obstruction. After temporary relief by opium, labor came on, and a child was delivered with forceps. She seemed temporarily better, but rapidly grew worse. On opening the abdomen occlusion of the bowel was discovered due to a congenital malformation. A coil of intestine was attached by an abnormal mesentery in such a way as to form a loop through which the transverse colon near the descending bowel had slipped. It was impossible to reduce the hernia, and the formation of an artificial anus was accomplished. The patient died of shock.

In addition to these cases, Meyer has collected fourteen—a total of sixteen. A few resulted from retroversion of the womb or from torsion in the pedicle of an ovarian cyst. Thirteen, however, were from other causes, and of these ten died. In none of these patients did emptying of the uterus prove of the slightest benefit, thus illustrating the rule that in the complications of pregnancy the complicating factor should be removed as soon as possible without interrupting the pregnancy.

The Function of the Decidual Cell.—FOTHERGILL (*Edinburgh Medical Journal,* March, 1899) contributes interesting observations upon the behavior of the decidual cell. In pregnancy the lining membrane of the womb has large nuclei with clear outline and abundant cell protoplasm. From the study of fleshy moles and placental polypi, Fothergill observed that decidual cells attack the cells of the embryo.

One of his cases was that of a multipara, aged thirty-five years, who had complete amenorrhœa for seven months. A fleshy mole was expelled, and recovery was rapid and complete. On examining the specimen its outer surface consisted of the maternal aspect of the placenta. The cavity of the ovum was intact, but contained nothing, the embryo having been absorbed. The amniotic surface of the placenta was thrown into elevations, separated by deep furrows. The mass was composed of villi, fibrin, decidual cells, and fresh blood compacted into a firm structure. On examining sections with the microscope it could be seen that the decidual cells had attacked the epithelia of the villi, causing them to disappear and reducing the villi to masses of connective tissue. The tendency of embryonal tissues to attack maternal parts has been frequently observed by others. The observations of Fothergill are interesting in view of the possible development of malignancy in these cases.

The Treatment of Puerperal Septicæmia by Antistreptococcic Serum.—In the *Transactions of the Obstetrical Society of London,* 1898, vol. xl., Part 4, WALTERS reports the case of a multipara who became septic after an incomplete abortion. Although the uterus was curetted, it was not completely emptied, and several days afterward the patient expelled parts of a macerated fœtus. She became intensely septic, the temperature rising to 103°, the tongue being very dry and the patient's pulse rapid. Two injections of serum, 10 c.c. each, resulted in immediate and marked improvement. The patient ultimately recovered.

In discussion, Routh said he had treated five or six cases and had seen a positive result in one. He thought that a positive diagnosis of streptococcus infection should be made before the serum was used. Robinson had treated seven cases of puerperal sepsis with serum; five of these died and two recovered. In one the injection had an immediate effect, and a membranous vaginitis was present, but rapidly disappeared. Phillips had seen one case in which the patient's recovery must be ascribed to the serum. Twenty injections were given in an illness of six weeks. Cullingworth did not believe it to be practicable to wait for a positive diagnosis of the presence of streptococci; he would inject the serum when the patient was septic. The womb had been thoroughly emptied and explored by the finger, and after this the patient did not improve.

Ectopic Gestation.—The *Transactions of the Obstetrical Society of London*, 1098, vol. xl., Part 4, contain the reports of several interesting cases of ectopic gestation. CULLINGWORTH describes the case of a woman admitted to the hospital, said to be suffering from retroversion of the pregnant uterus. Efforts were made to replace the tumor, but without success. It was thought that fœtal parts could be felt through the thin wall of the retroverted womb. The patient left the hospital, but returned again, complaining of severe pain in the lower part of the abdomen, constipation and pain on micturition. There was a dark-colored discharge, not offensive. Under anæsthesia the womb was found empty. There was a solid tumor in the anterior wall of the uterus, while behind the womb in the pelvis was a soft, elastic swelling, which could not be separated from the back of the cervix. The patient was kept under observation for two weeks, with no great change. Upon opening the abdomen an ectopic gestation was found behind a fibroid uterus. Hysterectomy was performed and the entire mass removed. Upon examination it was found that the fœtus had escaped from the tube and had made for itself a sac in Douglas' pouch. The uterus contained in its walls three fibroids.

In discussion Doran called attention to the fact that the fœtus and placenta in tubal pregnancy have been found to lie in separate dilatations of the tube. He thought the fœtal sac in this case lay in such a diverticulum. Cullingworth thought that the intramural portion of the tube was involved in this case.

On page 308 of these *Transactions* Sutton describes a tubo-abdominal pregnancy in which, on operation, the omentum was found stained with meconium. A fœtal hand was observed firmly grasping a coil of omentum. The fœtus was living and was rapidly extracted. The placenta derived its vessels from those in the great omentum. It was possible to ligate the omentum and the vascular connection of the placenta, and thus to control the blood-supply. The outer fifth of the right tube was removed, with a section of mesosalpinx. A narrow rubber drain was inserted, through which much serous fluid escaped for the first two days after the operation. The patient made a good recovery. The child died with convulsions shortly after birth.

The Origin, Growth, and Fate of the Corpus Luteum.—In the *Archiv für Anatomie und Physiologie, Anatomische Abtheilung*, reprinted in the *Johns Hopkins Hospital Reports*, 1898, vol. vii., No. 4, CLARK published a very interesting research upon this subject. He considers the growing follicle, the ruptured follicle, and corpus luteum in the various stages of their development, and then discusses the function which this body may possess.

During the stage of development increase in number and size of the lutein cells and of the connective-tissue cells and bloodvessels is observed, with the gradual formation of a connective-tissue ring from the fibres of the membrana propria, and also the appearance of fatty degeneration among the lutein cells.

These lutein cells are specialized connective-tissue cells, appearing in the inner layers of the follicle wall, where it begins to separate into internal and external layers. They gradually increase in size and number until they take on all the characteristics of lutein cells. Thus the corpus luteum is essentially a connective-tissue structure. When the follicle ruptures the membrana propria is broken through by lutein cells and bloodvessels, but re-forms a connective-tissue line in front of the lutein cells, which push it toward the centre, where it finally forms a dense core of interlacing fibres. After the rupture of the follicle the connective-tissue or lutein cells rapidly fill the empty cavity, after which they degenerate. This is brought about by the increasing density of the surrounding connective-tissue, and consists in fatty degeneration, followed by shrinking of the connective-tissue and hyaline changes until a very fine scar-tissue is left, which merges into the ovarian stroma. The larger bloodvessels of the corpus luteum are among the last structures to give way.

The function of the corpus luteum is that of a preserver of the ovarian circulation. As the woman grows older and the stroma of the ovary increases in density, the corpus luteum is slowly or imperfectly absorbed until its deposits hasten the cessation of circulation in the ovary.

Ovulation ceases because of the growing density of the ovarian stroma and the destruction of the peripheral circulation, which prevent the development of the follicles.

GYNECOLOGY.

UNDER THE CHARGE OF

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New Operation for Prolapsus Uteri.—WERTHEIM (*Centralblatt für Gynäkologie*, 1899, No. 14) conceived the idea of applying to cases of prolapse the principle of drawing down the uterus into the vagina and utilizing it to close a vesico-vaginal fistula, as suggested by Freund. A transverse incision is made in the anterior fornix, the vesico-uterine fold of peritoneum is opened, and the fundus uteri is drawn through the opening, each angle of the wound being sutured to the cervix. An oval denudation is then made on the anterior vaginal wall, extending from a point just above the meatus urinarius to one-half an inch below the transverse incision. The posterior surface of the corpus uteri is then denuded, and is united to the edges of the vaginal wound. In the two cases reported the operation required from twenty-five to forty-five minutes, the convalescence was afebrile, and the pre-existing vesical disturbances were at once removed. The anterior surface of the uterus underwent a process of granulation, and fresh epithelium developed. The organ diminished in size, and eventually presented only the condition of sharp anteflexion. Kolpoperineorrhaphy should be performed in order to furnish additional support.

Ventral Hernia.—ABEL (*Archiv für Gynäkologie*, Band lvi. Heft 3) traced the subsequent condition of 665 patients upon whom cœliotomy had been performed at the Leipsic clinic in the course of eight years. Only five patients were not heard from, and in the course of his investigations the reporter sent out nearly 2500 (!) letters; 97.5 per cent. of the patients were actually seen and examined. The following deductions were drawn: The integrity of the cicatrix depends primarily upon the method of suture and the manner in which the wound heals. Separate suturing of the fascia gives the best results.

The early resumption of severe physical exercise after operation has a marked influence upon the development of herniæ, as they then usually appear early, especially when the abdominal bandage is laid aside.

Hernia is more common in fat women, because exact apposition of the fascial edges is more difficult than in thin subjects, since peritoneum and subperitoneal fat are apt to be interposed. The muscular tone and general condition of the patient have no influence on the solidity of the cicatrix, but the suture and healing of the wound—in short, ventral hernia after abdominal section—is usually due to the operator rather than to the patient.

Fixation of the Prolapsed Uterus.—MITTHAUER (*Münchener med. Wochenschrift; Centralblatt für Gynäkologie*, 1899, No. 14) reports cases of vaginofixation and supravaginal amputation of the cervix for prolapsus, with accompanying anterior and posterior kolporrhaphy, in which cystocele and rectocele recurred, though the uterus remained anteflexed. Even when the uterus is extirpated according to Fritsch's method the vaginal prolapse may return. The same criticism is applied to ventral fixation undertaken for the relief of this condition.

Plastic Operation for Prolapsus.—CHIARLEONI (*Arch. Ital. di Gin.; Centralblatt für Gynäkologie*, 1898, No. 14) describes the following operation: Triangular surfaces are denuded on the anterior and posterior vaginal walls, with their bases toward the cervix, and are sutured in the usual way. The cervix uteri is then dissected up to a distance of over two inches, is split laterally, and each half is united as high as possible to the anterior and posterior edges of the vaginal wound. The portions of the cervix below the line of union are amputated. Finally a Hegar kolpoperineorrhaphy is performed. The writer claims that the cicatrices which result furnish a firm support to the uterus. Thirteen successful cases are reported.

Vaginal Hysterectomy with the Angiotribe.—TESSIER (Paris thesis; abstract in *Centralblatt für Gynäkologie*, 1899, No. 14) reports twenty-nine operations by Tuffier, with two deaths. His technique is similar to that of Doyen. The peritoneal cavity is opened anteriorly and posteriorly, the uterus bisected, and each half is pulled down. The angiotribe is then applied to the upper portion of each broad ligament from above downward, screwed tightly, and the tissue between the jaws of the instrument and the uterus is divided, after which the former is removed. The lower portions of the ligaments are treated in the same manner. In cases in which the uterus is fixed, clamps may first be used, the angiotribe being applied outside of them, after which the clamps are removed. The main point in the operation is to tighten the screw as firmly as possible while the instrument is held perfectly steady, otherwise when the tissues are friable it may tear away. It is also advisable not to grasp too much tissue at one time.

Vaginal Section.—DALLY (Paris thesis; *Ibid.*) argues against the advantages of the vaginal as compared with the abdominal incision, on account of the greater danger of injuring important structures. He would limit vaginal section to cases in which a collection of pus is easily accessible through the posterior fornix. Diseased adnexa are best removed by cœliotomy or vaginal hysterectomy. Explorative vaginal section furnishes much less information in a doubtful case than is obtained by the abdominal route. While the mortality is certainly small, the ultimate results of vaginal section are not as satisfactory as has been represented, especially in complicated cases; fistulæ frequently persist, requiring a subsequent radical operation for their cure.

Disinfection of the Hands with Alcohol.—AHLFELD (*Zeitschrift für Medicinalbeamte*, 1898, Heft 17 and 18) wonders that surgeons assign so little value to alcohol as a disinfectant. The statement of Mikulicz that it does not destroy the bacteria in the deeper layers of the skin he believes to be erroneous. Alcohol having a strength of 96 per cent. is preferable to weaker solutions. Bichloride solution is unnecessary, and other antiseptics in order to be efficacious must be used in such strong solutions as to injure the hands. The writer believes that the method of disinfection by scrubbing with soap and hot water and then with alcohol will be preferred in the future, by both surgeons and midwives. Moreover, brushes, catheters, intra-uterine tubes, etc., can be disinfected in the same way. A 50 per cent. solution of alcohol is useful for disinfecting the external genitals in obstetric practice.

TJADEN (*Zeitschrift für Geb. u. Gyn.*, Band xxxviii. Heft 3) believes that alcohol is a good germicide as well as a mechanical cleansing agent. From a large number of bacteriological experiments he infers that 75 and 90 per cent. alcohol has a more powerful bactericidal action than either 50 per cent. or absolute. He recommends Fürbringer's method. Over four hundred examinations of the hands of midwives were made after careful disinfection, and in only nine instances were germs absent. Moreover, the women were kept in the clinic for a week at a time, so that they were not exposed to outside sources of infection. The writer's comment on these facts is that it is no wonder that the number of deaths in Germany from puerperal septicæmia is about 3500.

Appendicitis of Adnexal Origin.—Under this title BARNSBY (*Revue de Gyn. et de Chir. Abdom.*, 1898, Nos. 5 and 6) describes those cases in which disease of the appendix seems to be secondary to inflammatory conditions of the tubes and ovaries. He is skeptical regarding the existence of the so-called ligament, which Clado affirms extends from the right ovary to the appendix, and serves to establish a direct lymphatic connection between the two, having examined 127 cadavers without finding it in a single instance. The appendix and left tube and ovary are entirely independent anatomically, though they may become adherent after prolapse of the former or ascent of the latter through the traction of bands.

After such adhesion has occurred the appendiceal mucosa may be infected in the usual manner from within, or inflammation may extend from the diseased adnexa to the appendix. In the latter condition there is a simple adhesion of the tip of the appendix, attended with hyperæmia and the subsequent formation of new connective tissue. In more advanced cases the entire appendix may be surrounded by exudate, with resulting cirrhosis and disappearance of the lumen. There are no pathognomonic symptoms. Cœliotomy is always indicated.

The writer concludes with the advice to examine the appendix in every case in which the abdomen is opened, and to remove it without hesitation whenever the tip is adherent to the tube or ovary, whether its serum covering is congested or not.

Etiology and Development of Uterine Fibromyomata.—KEIFFER (*Soc. Belge d'Anat. Path.; La Gynécologie*, February 15, 1899), in studying the vascular supply of the uterine muscle by means of injections, found small, bloodless foci (*ilots*), which seemed to increase in size at the expense of the surrounding muscular fibres. Around the minute myomata were zones of vascular tissue, which evidently served to nourish them. In the centre of the nodule could often be seen what appeared to be the lumen of a blood-vessel which had not been reached by the injecting fluid. These myomata grow first centripetally, then horizontally.

The writer infers that uterine fibromyomata represent a localized hypertrophy of the tissue in the neighborhood of certain vessels (*réaction hypertrophique*), or the isolation of vascular areas due to thrombosis, prolonged pressure, or other circulatory disturbance. In the higher mammals, in which the muscular structure and vascular supply of the uterus is more complex, myomata are more apt to develop than in the lower varieties. This is borne out by clinical observation.

Intraperitoneal Fixation of the Uterus Through the Vagina.—GOTTSCHALK (*Centralblatt für Gynäkologie*, 1899, No. 4) reports fourteen cases of retroflexion treated by the following method: After replacing the uterus (adhesions being broken up by posterior vaginal section) the cervix is drawn backward and held by an assistant, while the bladder is separated as in vaginal hysterectomy. After incising the peritoneum the utero-vesical fold of peritoneum is seized with forceps and drawn down over the anterior surface of the uterus, to which it is sutured as low as possible, the fundus being drawn through the opening. The peritoneal and vaginal wounds are then closed. The uterus is held in its normal position and retains its normal motility and relations to the bladder, which is not the case after Dührssen's operation.

New Operation for Inversion—WESTERMARK (*Ibid.*) reports a case of irreducible inversion in which he opened the posterior fornix, inserted one finger into the ring from above, and, while steadying the uterus in this way, incised the posterior wall. By compressing the anterior wall with the thumb while the edges of the wound are pressed inward the inversion was easily reduced. The uterus was then brought through the vaginal opening, and the wound was sutured with catgut, after which the organ was replaced within the peritoneal cavity, and the wound in the posterior cavity and the posterior fornix was sutured. The patient made a good recovery.

Malignant Disease of the Stump After Supravaginal Amputation.—In a discussion on this subject (*Ibid.*) ABEL referred to two cases of sarcoma of the cervix following supravaginal amputation. Saenger cited eight cases of cancerous degeneration of the cervix, but thought that in view of the lower mortality of supravaginal amputation as compared with total extirpation (4.1 per cent. to 9.6 per cent., according to Hofmeier), the rare possibility of secondary malignant degeneration could be disregarded. The cervix could easily be removed *per vaginam* if it became diseased.

Freund's Operation for Vesico-vaginal Fistula.—ROMM and KAHN (*Ibid.*, 1899, No. 7) reports six cases of complicated vesical fistulæ operated upon successfully by the method described by Freund. Douglas's pouch was opened, the fundus uteri drawn down through the opening, and after freshening the edges of the fistula and the posterior uterine wall near the fundus the latter was sutured to the bladder, so as to close the fistula. Extensive granulation of the anterior serous surface of the uterus occurred, so that after healing the result was practically a kolpocleisis. Freund recommends that a permanent opening be established in the fundus in order to allow the escape of blood during menstruation, but the writers found that it was unneccessary, as the uterus soon atrophied after the operation.

Effects of Castration on the Voice.—CASTEX (*Revue Pratique d'Obstétrique et de Gynécologie*, 1899, No. 1) reports a series of observations on singers who had submitted to castration, with and without extirpation of the uterus. He infers that the operation has no direct harmful effect upon the voice, although the subsequent nervous disturbances may exert an influence upon it.

Exceptionally, the voice may assume a slightly masculine tone, but in general fine voices recover all their former range and flexibility, so that this is one of the least of the unpleasant sequelæ of castration.

DERMATOLOGY.

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Treatment of Keloid by Injections of Creosote in Oil.—BALZER an MONSSEAUX (*Annales de Dermatologie et de Syphiligraphie*, 1898, No. 12 report a case of keloid of the lobule of the ear, following the removal of a small tumor, successfully treated by injections of a 20 per cent. solution of creosote in olive oil. At each seance about one cubic centimetre was injected into different parts of the keloidal tumors, of which there were two. These injections were followed by very little pain, but a few days after the first one a portion of the keloidal tissue sloughed out, leaving a deep ulcer, which soon cicatrized. At the time of making the report the smaller of the two tumors had entirely disappeared and the larger was considerably reduced in size.

Acute Pemphigus Neonatorum.—BERNSTEIN (*Monatshefte für Praktische Dermatologie*, Band xxviii. No. 1) reports five cases of a bullous eruption, all occurring in the same family. The first to be affected was a three-weeks-old infant; later three other children, aged respectively three, four, and seven years, together with the mother, were attacked. Syphilis, impetigo contagiosa, urticaria bullosa, and varicella were all considered in the diagnosis and excluded for what seemed to the author sufficient reasons. The eruption upon the infant was regarded as a pemphigus of the new-born, which was transmitted later by contagion to other members of the family.

[We are by no means satisfied that the diagnosis of impetigo contagiosa can be excluded in these cases.]

Subacute Infectious Purpura.—MOSSÈ and IVERSENC (*Journal des Maladies Cutanées et Syphilitiques*, November, 1898), at the meeting of the French Association for the Advancement of Science, held at Nantes, reported the case of a young man, aged seventeen years, who, after some excesses and a slight traumatism, showed lassitude, and later a typhoid condition, accompanied by marked elevation of temperature. An eruption of macules appeared, which rapidly extended; melæna followed, and death shortly occurred. During life examinations of the blood showed it to be sterile, but at the autopsy three varieties of micro-organisms were found in the liver—the bacterium coli; an organism resembling the colon bacillus externally, but staining by the Gram method; a short, thick bacillus, also staining by Gram. In the lungs streptococci were found. The authors regard the previously debilitated condition of the patient as furnishing a soil favorable for infection. Experimental inoculations practiced upon animals produced in one instance hemorrhages into the lungs, in others the characteristic picture of infection with the colon bacillus.

Mixed Sclerodermia.—H. RADCLIFFE-CROCKER (*British Journal of Dermatology*, January, 1899), at a meeting of the Dermatological Society of Great Britain and Ireland, exhibited a patient with the atrophic form of morphœa upon the chest and perceptible hardening of the deltoid and triceps, especially on the left side. Improvement, to a certain extent, had occurred under treatment. The skin over the chest was much atrophied. The exhibitor regarded the case as going far to prove that superficial morphœa and deep sclerodermia were only variations of the same process.

Multiple Cutaneous Lupus Following Measles.—ADAMSON (*British Journal of Dermatology*, January, 1899) reports a case of verrucose lupus, with multiple lesions, occurring in a boy three years of age, in which the eruption was said to have appeared first during an attack of measles when the patient was two years of age. The lesions appeared simultaneously, and since the first eruption there had been no new lesions, although the old ones had grown larger. The eruption consisted of raised, purplish-brown patches, from a tenth to a quarter of an inch in diameter. Many were scaly, and those upon the hands were warty. They were most abundant upon the right elbow, the right wrist and hand, on both knees, and the right ankle and foot. Later the patient was treated for post-pharyngeal abscess and hip-joint disease. There was no family history of tuberculosis.

An Affection of the Skin Due to the Demodex Folliculorum.—DEAMICIS (*British Journal of Dermatology*, January, 1899), at the annual meeting of the Italian Society of Dermatology and Syphilography, described a parasitic affection of the skin due to the demodex folliculorum, which appeared as a pigmented patch of a café-au-lait color upon the chin and lip of a woman, aged twenty-seven years. The discoloration was at first thought to be due to the microsporon furfur, but this fungus could not be found. Large numbers of demodex were present, however, and treatment directed to the removal of this organism was followed by the gradual disappearance of the pigmentation. Majocchi likewise had seen two cases in which the demodex had been found in pigmentation of the skin accompanied by slight desquamation,

Tuberculous Folliculitis.—KRACHT (*Annales de Dermatologie et de Syphiligraphie*, 1898, No. 12), at a seance of the Dermatological Society of Moscow, presented a youth, aged seventeen years, with an abundant eruption upon the face, the backs of the hands, the extensor surface of the forearms, the buttocks, the knees, and over the tendo Achillis. The anterior surface of the forearms was entirely, the trunk almost, free. The eruption consisted of millet-seed-sized, bright-red, umbilicated nodules, covered with a small crust. Between the lesions were numerous small cicatrices. The eruption began as a macular one, but the macules were soon transformed into papules, and later into crusts. The disease was accompanied by slight itching.

A Papular Persistent Dermatosis.—Johnston (*Journal of Cutaneous and Genito-urinary Diseases*, February, 1899), under the above title, reports a case of a hitherto undescribed affection. A woman, aged fifty-two years, suffered from a papulo-vesicular eruption scattered over the face and limbs. On the face it occupied the central portions—forehead, cheek, lips, and chin. On the extremities the extensor surfaces were affected. The lesions varied from a pin-head to a third of an inch in size, and were rose-red at first, but became grayish-white later from thickening of the horny layer of the epidermis. They began subcutaneously, involving the epidermis only after a considerable length of time. There was marked itching, so violent as to prevent sleep. Examination of excised lesions showed that the entire corium was affected by an inflammatory process of a chronic character, a special and peculiar feature of which was the involvement of the medullated nerves of the reticular layer. The epidermis was only secondarily involved, the chief changes being great increase in the horny layer and the formation of a vesicle near the centre of the papule, through degeneration of the prickle-cells. The author regards the malady as a neurotic inflammation more closely related to the prurigo of Hebra than to any other recognized skin affection.

Malignant Growths Arising from Pigmented Moles.—Gilchrist (*Journal of Cutaneous and Genito-urinary Diseases*, March, 1899) reports two cases of melano-carcinoma, one of which certainly, the other probably, began in a pigmented mole. The first case occurred in a full-blooded negro, aged fifty-eight years, and the primary growth was followed by numerous metastases in the skin, the superficial lymphatic glands being unaffected even up to the time of death. Although there was no history of a mole having been present at the site of the primary lesion, the author thinks it probable that the neoplasm began in such a growth. The second case began in a pigmented mole upon the face. In connection with these two cases a study of the histology of pigmented moles was made, especially with regard to their origin; and as the result of this study the author is in accord with Unna that the epithelioid cells of which moles are chiefly composed are of epidermal origin. Any malignant growth originating from these cells, therefore, must be regarded as carcinomatous, not sarcomatous.

Trophic Dermatosis Following Fractures.—Zeisler (*Journal of Cutaneous and Genito-urinary Diseases*, July, 1898) calls attention to certain trophic alterations which he has observed after fractures. Having had the misfortune to fracture his right femur, he observed that the growth of the nails upon the toes of the corresponding side ceased for six weeks. In addition to the suspension of the growth of the nails, small isolated, deep-seated vesicles, which itched intensely, developed upon the sole of the right foot. These the author believes resulted from the altered nutrition of the limb following upon the fracture. He also reports a case of papulo-vesicular eruption following shortly after a fracture of the radius in a baby.

PATHOLOGY AND BACTERIOLOGY.

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Concerning Infarcts of the Kidney.—RIBBERT (*Virchow's Archiv*, 1899, Band clv, Heft 2, S. 201) states first the facts which are generally accepted in regard to infarctions of the kidney, viz.: Infarctions are wholly hemorrhagic only exceptionally; as a rule, they are pale, and represent anæmic necroses which at first are limited toward the normal tissue by a zone of cellular infiltration and hyperæmia. Later a formation of connective tissue takes place at the border, the necrotic material gradually disappears, and a depressed scar remains. He then discusses certain features of renal infarcts which he has studied, partly as found in man, partly as produced experimentally in animals. The form of the renal infarct has usually been described as wedge-shaped. As a matter of fact, wedge-shaped infarctions, in the sense in which they occur in other organs, do not occur in the kidney. The interlobular arteries of the cortex do not diverge, but run parallel toward the capsule. Stoppage of them or of the larger arteries (arteriæ arciformes) supplying them leads in the cortex to necroses which are quadrilateral in shape. This is seen best when the whole thickness of the cortex is involved. The infarctions are quadrilateral on all sides. Naturally the side toward the medulla is a little smaller than the capsule side, because the interlobular vessels diverge slightly from below upward. According to the number of interlobular arteries affected the infarction may be a horizontally lying rectangular solid, a cube, or, in extreme cases, where only one interlobular artery is obstructed, a vertically placed, rectangular column. When a number of adjoining interlobular arteries are obstructed at different heights the lower surface of the infarct may be very irregular in shape. If the central vessel in one of these areas is occluded near the medulla, and the vessels around it near the cortex, a wedge-shaped infarction may be formed. The term wedge-shaped applies more appropriately, however, to infarcts involving both cortex and medulla, because the vessels of the pyramids converge toward the papilla. But such infarctions differ from those in the lung and spleen, because the occluded vessel lies not at the apex of the wedge, but in the middle, where the cortex and medulla join.

During the first twelve to sixteen hours the necroses are hyperæmic in consequence of the blood entering through the capillary collateral circulation. Then the circulation ceases. The blood coloring-matter is dissolved out, and the infarction becomes pale. The early hyperæmia and the transudation from the bloodvessels explain the prominence of the infarction above the surface of the kidney. Histologically, the necrosis of an infarction is evident earliest at the periphery, because, owing to the better circulation of the lymph there, the nuclei are dissolved out quickly, and hence do not stain. For a number of days the infarction shows three zones at its periphery, from within outward. They are, first, a zone of cellular infiltration; second, a zone of hyperæmia; third, a zone of partial necrosis. The infiltraton of leucocytes at the periphery of an infarction is well marked in twenty-four hours.

It is chiefly of interest because it limits the collateral circulation, and finally stops it entirely. Beneath the capsule it takes place more slowly, probably because the circulation there is less active. The hyperæmic zone is due to congestion of the bloodvessels resulting from a collateral circulation under diminished blood pressure. The pale zone outside of it is only relatively anæmic. The circulation in it is fairly active; the pale color is due in part to partial necrosis of the tubules.

The Importance of Injuries of the Arteries in the Production of True Aneurisms and Arterio-sclerosis.—MALKOFF (*Ziegler's Beiträge*, 1899, xxv.) has succeeded in producing aneurisms experimentally. He employed two methods, either injuring the wall directly by compression or indirectly by locally increasing the intravascular pressure. In the compression experiments, which numbered twenty-eight, the femoral, brachial, and carotid arteries of the dog were selected. The arterial trunk was exposed and compressed with a pair of Péan's forceps. Excessive force was avoided, so that the continuity of the vessel-wall remained intact and no hemorrhage occurred. The skin incision was closed with sutures. The operations were performed under aseptic conditions, and the wounds healed without suppuration.

In two cases the second method was employed. The common carotid artery was subjected to a strong local distention by the injection of physiological salt solution. Temporary ligatures were first applied to the common carotid and superior thyroid arteries; a canula inserted into the former and a pressure of two atmospheres applied for fifteen seconds. The vessel became considerably distended.

The arteries were examined at varying lengths of time after the injury, ranging from four hours to a hundred days.

In the arteries injured by compression tears occurred in the intima, elastica interna, and media. A spindle-shaped or cylindrical aneurism developed; but after forty days the lumen was restored to normal size or even became abnormally small. This was brought about by arterio-sclerotic changes. The intima was markedly thickened and a newly developed elastic tissue plainly discernible in it. The elastic fibres developed themselves from the peripheral portion of the cells and formed a delicate network. A new formation of connective-tissue also occurred in the media. Similar but less marked changes were obtained by local distention of the vessels. Scattered areas of fatty degeneration were found, and even within twenty days after the injury a deposition of lime-salts.

[In these experiments of Malkoff the development of arterio-sclerosis began at once after dilatation of the vessel had taken place. This is in accord with Thoma's view that arterio-sclerosis is in a certain sense a compensation process and tends to prevent rather than cause the aneurismal formation. These experiments also confirm the recently published observations of Dmitrijeff, Jores, and others, who claim that a new formation of elastic tissue occurs in arterio-sclerosis.—ED.]

On the Morphology of Intravascular Coagulation and Thrombus Formation.—ARNOLD (*Virchow's Archiv*, 1899, Band clv.) thinks his observations show conclusively that the blood-platelets are formed from the red blood-corpuscles, and that certain degenerative changes in the red blood-corpuscles stand in close relation to fibrin formation and blood coagulation.

These changes are of three kinds: (1) Erythrocytolysis, a simple diminution in size leading to the formation of microcytes and finally complete disappearance. This process of solution can be demonstrated by staining with methyl violet. The red corpuscles appear surrounded by a zone which agrees in its staining reaction with their contents. He designates as (2) erythrocytorrhexis, the extrusion of round, refractive granules—A. F. Müller's "blood dust," and the nipping off (Abschnürung) of particles of varying size. (3) Erythrocytoschisis is the breaking up of the red blood-corpuscles simultaneously or in rapid succession into disk-like bodies. Many of these fragmentation products are identical in structure with the blood platelets.

In extravascular coagulation Arnold always found the fragmentation more active than under other conditions—*e. g.*, a suspension in physiological salt solution.

In the mesenteric vessels of living animals he was able directly to observe the formation of blood-platelets by erythrocytorrhexis and erythrocytoschisis, thus definitely settling, he thinks, the question of their origin. In beginning coagulation the leucocytes were either absent or present only in small numbers. They showed no signs of degeneration even when the act of coagulation was completed.

He studied in rabbits the thrombosis produced by the injection of foreign bodies into the circulation, and also vital and agonal thrombi in man, and was able to demonstrate in each the formation of blood-platelets from red blood-corpuscles, and also the production by erthroctyolysis of microcytes and "shadow" corpuscles. Wlassow distinguishes two kinds of fibrin-threads: 1. The simple or homogeneous. 2. The complex or granular. Arnold suggests that the former arise by plasmolysis, the latter by fragmentation of the erythrocytes, platelets, and granules.

An Aneurism of the Temporal Artery.—MANZ (*Beiträge z. path. Anat. u. z. allg. Path.*, Band xxiv., Heft 3, S. 534) describes an unusually interesting case of traumatic aneurism of the temporal artery. The tumor, which in the course of two years had reached the size of a hazel-nut, upon histological examination presented an irregularly shaped cavity, the walls of which corresponded in a general way to the walls of the artery. The smooth muscle fibre of the tunica media was limited to about one-fifth of the wall of the sac, elsewhere the wall consisted of connective tissue and elastic fibres lined throughout with endothelium. The "inner coat" was everywhere thickened, in many places sending papillary projections of various sizes and shapes inward into the cavity, dividing it up into irregularly shaped canals. Orcein preparations showed an abundance of elastic tissue; thick fibres placed closely together under the endothelium, a few delicate fibres between this and the remains of the inner elastic plate near which there was scarcely any elastic tissue, and a "nucleus" of elastic fibres situated in the long axis of the papillary projections of the inner coat.

The writer concludes that the conditions here existent represent a process of repair originating in the inner coat of the damaged vessel, and consisting of a new growth of connective tissue and of elastic tissue. The latter he believes to be derived not from the inner elastic plate, but from elastic tissue fibres present in the subendothelial connective-tissue.

The Denitrifying Action of the Bacillus Typhosis and the Bacillus Coli Communis.—GRIMBERT (*Annales de l'Institut Pasteur*, January, 1899) investigates the cause of a phenomenon he had observed nearly a year before, namely, that the bacillus coli communis and the bacillus typhosus do not disengage gas in 1 per cent. solution of peptone plus 1 per cent. potassium nitrate, but that gas is produced when the peptone solution is replaced by bouillon made of meat extract.

His present work furnishes the following conclusions:

1. Whenever the bacillus coli communis and the bacillus typhosus disengage gases in a medium containing nitrates the volume of nitrogen recovered is always at least double the amount which the nitrate destroyed could possibly produce.
2. Consequently the nitrogen does not come exclusively from the nitrates, but also results from the denitrifying action of the bacillus upon amido principles in the culture medium.
3. Gas production seems to result from the secondary reaction which nitrous acid, formed by the bacteria, exerts on these amido substances.

Nitrites do not hinder the action of the bacilli, as the latter develop very well in a medium containing 1 per cent. of nitrites, and disengage an equal or even larger quantity of nitrogen than in the same medium containing 1 per cent. of nitrates.

The rôle of amido materials in denitrification, as the result of the action of the colon bacillus, may perhaps throw some light on the still pending question of the loss of nitrogen in the soil.

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